THE IRON TRADE REVIEW

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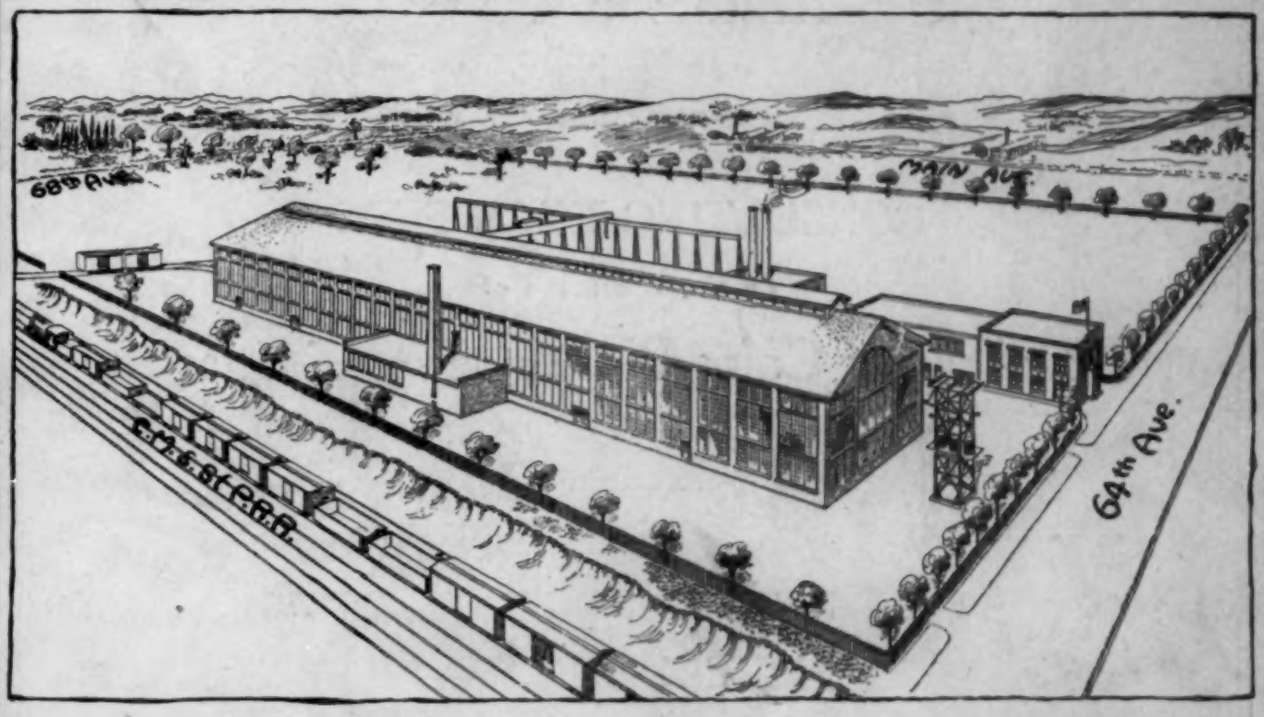

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THE IRON TRADE REVIEW

Vol. LIX Cleveland, October 12, 1916 *No. 15*

Submarine Causes Discussion

While the Busy Iron Trade Continues to Take Orders—Pig Iron Very Strong—Increased Activity in Railroad Buying

WITH deep interest and some apprehension, the iron trade awaits the outcome of the new submarine warfare of the German government. Already at least one important railroad system has ordered embargoes against shipment of iron and steel products and it is expected that if the submarine attacks recur with much frequency, shipments of all kinds of products and machinery for export will be very much curtailed. Hope is entertained, however, that the destruction of vessels will not be continued. The rapid advance of insurance rates of ocean freight is already an important factor, but it is intimated that England and other governments will absorb additional charges of this kind.

Pig Iron

Owing to the advances which have already taken place in the coke market and to the expected higher prices of iron ore, and also to the very active demand, prices of pig iron are moving up rapidly. In some cases, however, very high quotations which have been made were by sellers who were not anxious to take on additional tonnages at the present time. The Bethlehem Steel Co. has appeared in the central west with an inquiry of from 12,000 to 15,000 tons of bessemer of higher silicon analysis than usual and furnace interests are not showing any eagerness to take this business. Prices of low phosphorus pig iron are very high and as high as $40, eastern furnace, has been paid. Ruling quotations at Pittsburgh are $23, valley, on bessemer and $20 on basic, foundry and malleable. The Trumbull Steel Co. is understood to have purchased 26,000 tons of basic at $20 and 10,000 tons at $19, valley.

Iron Ore

It is estimated that higher expenses, due to advances in wages and higher prices for powder and other supplies, will make the cost of mining iron ore in the Lake Superior region 30 cents per ton more next year, and it is also expected that there will be an advance of from 30 to 50 cents on ore carrying charges, while royalties in many cases will be higher on sliding scale contracts. Hence it will not be surprising if the price of iron ore is $1 per ton higher next year.

Coke

In spite of the large increase in the output of by-product coke, prices of Connellsville bee-hive coke have advanced rapidly and spot furnace fuel has sold at $4.35, while some sellers are holding foundry grades for prompt delivery at $6. Several furnace interests have contracted for large tonnages and, on the whole, the coke market is very active.

Tin Plate

Leading independent manufacturers of tin plate have named a price of $6 per base box of 100 pounds for the first half of next year. This is the highest price which has ever prevailed in the history of the industry, the next highest having been $4.65, in 1899. Buying has started without much hesitation and it is predicted that even higher prices may prevail later in the year.

Railroad Buying

Buying of rails for delivery in 1918 has now reached about 100,000 tons with the Steel Corporation. Among the roads which placed orders are the St. Paul & St. Louis and the San Francisco. The inquiry of the French government for rails has been increased to 50,000 tons. Car buying has been very active during the past week and fully 6,000 cars have been ordered. New inquiry is active. The Russian order for 1,000 locomotives, it is now understood, has been finally closed with the American, Baldwin, Lima and Canadian companies. Car builders have placed large tonnages at 2.70c for shapes, 3c for plates and 3.10c for axles.

Plates

The Steel Corporation mills have booked about 20,000 tons of steel for seven additional merchant vessels for delivery early in 1918. A tremendous volume of plates, estimated at 300,000 tons, is pending for ship building and many other buyers are in the market.

THE OPEN HEARTH

Time to Keep Cool

IT WOULD be folly to attempt to belittle the wonderful achievement of the German sub-marine in crossing the Atlantic and, within a few miles of the American shore, sinking at least six vessels. Even in these days when one is so often thrilled, this latest feature of the great European war causes one to pause and wonder what will be the result. That the wholesale destruction of vessels is possible cannot be doubted and it is not at all clear that means can be devised successfully to combat the submersible warships. It would be rash, however, to conclude at the present time that commerce between the United States and European countries will be seriously interrupted.

When the history of the past two years is recalled, it is remembered that the initial efforts of German submarines caused a feeling akin to terror to sweep over this country and the feeling was intensified a little later by the sinking of LUSITANIA. The torpedoing of a few more American vessels followed and then was inaugurated a period of inaction on the part of these marvelous boats of the undersea. Whether this new policy was due to American protest or to successful efforts of the entente allies to resist and prevent submarine warfare is not positively known. Probably both protest and resistance were factors, but a strong impression was created that submarine warfare had not proved as efficient and destructive as had been hoped by the Germans.

The story of the Zeppelin raids is similar to that of the submarines to the extent that the initial efforts caused great alarm as well as considerable damage, but in spite of the persistent use of the Zeppelins, they have not proved a really important factor in the war. They have killed women and children and some men and have damaged property to a limited extent, but that is all, and the efforts of the aircraft of the British and French frequently have been crowned with success.

Will the history of new submarine warfare be similar to that of the earlier abandoning of the undersea attacks and to the failures of the Zeppelins? No one can tell. If the Germans have solved the physical and mechanical difficulties and have devised a method of carrying on the undersea warfare without conflicting with the laws of nations, immeasureable damage may be done. Surely the movement of ships will be interfered with to a large extent, temporarily.

It is a time for cool heads. There is no occasion for being panic stricken, or for fearing a collapse of prosperity in this country. Nor, on the other hand, is it time to minimize dangers. Let us calmly await developments.

A Mere Bagatelle

THE announcement just made that the Bethlehem Steel Corporation is preparing to establish in New Jersey a large proving ground for ordnance which will be among the most extensive in the world, is worthy of the attention of the ardent advocates of a government-owned armor plate plant. Purchases of land, it seems, have been made quietly for a number of months and the company is now in possession of a tract about 18 miles long and 6 miles wide. It is also announced that the company will expend a large amount of money to prepare the ground for the testing of ordnance and armor plate which it is manufacturing for the United States and foreign governments. This little matter of a proving ground furnishes just a hint of the expenditure of money that is necessary in order properly to equip an armor plate plant, but of course a little matter of a few hundred acres and the necessary equipment of a proving grounds would not worry the people who think that the government ought to go into the armor plate business regardless of cost.

A Question Involving Twenty Million Dollars

SHALL the government expend $20,000,000 for the establishment of a nitrate plant? This is a highly important question and it is fortunate that in the passage of the act authorizing the proposed nitrate plant its building is not made mandatory upon the President, who is directed to investigate various methods of manufacturing nitrate. Hence it would be very desirable for the President and his subordinates who may be entrusted with the investigation of the subject to peruse such papers as those which were read at the recent meeting of the American Chemical Society. We wish to call attention particularly to a paper on the extraction of nitrogen and nitrates from bituminous coal, presented at the meeting by C. G. Atwater, manager of the agricultural department of the Barrett Co., New York.

Mr. Atwater shows that in speaking of the potential amounts of ammonia recoverable from bituminous coal, it has been the habit to refer to the amount of coal actually made into coke and no account was taken of the probable growth of the iron industry.

The ammonium sulphate production in the United States in 1915 is estimated at 220,000 net tons. The largest amount of coal made into coke in any one year, including bee-hive, by-product and gas house cokes, was about 73,000,000 tons in 1913. Mr. Atwater thinks this should have yielded over 700,000

THE OPEN HEARTH

tons of ammonium sulphate, the maximum recovery being a little less than one-third of the maximum amount possible. He estimates that the 2,600 by-product coke ovens actually under construction and the 1,100 more definitely decided upon, will add about 15,000,000 tons of by-product coke to the annual capacity when completed, so that within two years an output of 400,000 tons of ammonium sulphate per year is possible if business conditions favor complete operation. The output of bituminous coal for 1916 is estimated at 500,000,000, and if 1 per cent in ammonium sulphate is recovered, this would amount to 5,000,000 tons per annum. All of this ammonia is recoverable, and all but a very little is now wasted. Mr. Atwater says that of course the objection will be raised that it is difficult to recover by-products from the simple furnaces in which most of the coal is consumed, but he calls attention to the fact that a notable amount of progress recently has been made in substituting methods of fuel treatment that permit of ammonia recovery. Having shown that there is no question about the supply of ammonium sulphate, Mr. Atwater discusses the transformation of ammonia to nitric acid and submits the following important statement from an authority which he says is unquestioned:

"Independent laboratory investigations have definitely shown that we can purify coke-oven ammonia on a commercial scale quite well enough to permit satisfactory oxidation to nitric acid. The expense of purification is well within reasonable limits, and the experiments indicate that there is no practical obstacle to the use of coke oven ammonia for nitric acid manufacture. Definite statements on this point are withheld until an actual commercial demonstration can be made."

As further evidence of the practicability of the oxidation process, Mr. Atwater quotes Lewis A. Riley, of New York, in regard to the Ostwald process for the oxidation of coal ammonia to nitric acid and, in conclusion, quotes from the last edition of Lunge on Coal Tar and Ammonia, the following important statement:

"The synthetical production of ammonia from atmospheric nitrogen must find its limits in the impossibility of producing the requisite enormous amount of electrical energy ad infinitum, whether by waterpower or otherwise. As far as we can look forward, the principal source of ammonia will be always the nitrogen of coal, just as has been the case for a long time past with the comparatively small fraction of coal consumed for the manufacture of illuminating gas, and more recently by carrying out the coking of the coal in such a way that the formerly lost by-products, ammonia and tar, are recovered. This last proceeding is sure to be more and more extended. Even the general conversion of the coal to be used for heating, into gaseous fuel, with recovery of its nitrogen in the shape of ammonia, is within visible distance."

The statements made by Mr. Atwater are positive and convincing. They show that while much is still to be learned in regard to the various processes discussed, the weight of the evidence is against the recovery of ammonia from atmospheric nitrogen. The entering upon such an experiment involving the expenditure of $20,000,000 when there is positive evidence that the by-product coke plants of the country and other concerns using coke can furnish all the material necessary for the government would be folly even worse than the expenditure of $11,000,000 for a government armor plate plant.

Protection---Not Commercial War

THE TREND toward protective tariff in England is unmistakable. Recent meetings of labor unions, whose members had been most ardent free traders, indicated a breaking away from that policy, or at least a tendency to consider the desirability of adopting some form of protection. This is the mildest form of opposition to the historic free trade policy, but the other extreme is the opposition of the British Empire Producers' Organization, which claims to have among its members delegates from numerous colonies of the empire. This body has recently issued a manifesto, in which it declares that Germany is making preparations for a gigantic commercial war and says that to meet this menace the organization has been formed to promote a national policy, which will unite the British dominions with the United Kingdom for mutual defense and mutual support. It is proposed "that the empire shall produce and manufacture all its own requirements; that British capital shall be attracted to British industries; that British merchandise shall be carried in British ships; that British workingmen shall be employed in preference to foreign workingmen, and be secured against competition by sweated alien labor."

What a dream this is! An empire living entirely unto itself without need for anything from any other part of the world! Of course, the extreme view will not prevail, but it seems certain that some sort of protection will be adopted, and it is equally certain that in forming its tariff policy the United States will be compelled to keep in mind the change of sentiment in the British empire.

At the same time, the United States should give the nations of the earth distinctly to understand that it is not in favor of a commercial war after the present bloody war is ended, but intends to protect its own interests, while treating all nations fairly.

Prices Present and Past

(Yesterday, a month ago, three months ago and a year ago.)

Quotations on leading products October 11, average for September, 1916, average for July, 1916, and average for October, 1915. Prices are those ruling in the largest percentage of sales at the dates named.

	Prices Oct. 11, 1916.	Aver. for Sept., 1916.	Average for July, 1916.	Aver. for Oct., 1915.
Bessemer pig iron, Pittsburgh	$23.95	$22.20	$21.95	$16.95
Basic pig iron, Pittsburgh	20.95	19.075	18.95	15.95
No. 2 Fdy. pig iron, Pittsburgh	20.95	19.50	19.45	15.57
Northern No. 2 Fdy., Chgo.	19.00	18.65	19.00	14.45
Lake Superior Charcoal, Chgo.	20.75	19.75	19.75	16.25
Malleable, Chgo.	19.50	19.15	19.50	15.12
Southern No. 2, Birmingham	15.00	14.38	14.00	11.75
Southern Ohio No. 2, Ironton	19.00	18.25	18.38	14.88
Basic, eastern Pa.	20.50	20.00	19.00	17.50
No. 2X Virginia furnace	17.50	17.50	18.50	14.00
No. 2X foundry, Philadelphia	20.50	19.75	19.75	16.50
Ferro mang., Balti	164.00	164.00	172.50	105.00
Bessemer billets, Pbgh.	45.00	45.00	40.00	25.50
Bess. sheet bars, Pbgh.	45.00	45.00	40.00	25.50
Op.-h'th sh. bars, Pbgh.	45.00	45.00	40.00	26.50
Open-hearth billets, Pbgh.	45.00	45.00	40.00	26.50
Steel bars, Chgo.	3.10	2.79	2.69	1.59
Steel bars, Pittsburgh, contr.	2.60	2.60	2.50	1.41
Iron bars, Philadelphia	2.659	2.659	2.559	1.559
Iron bars, Cleveland, local del'y.	2.55	2.40	2.40	1.50
Iron bars, Chgo. mill	$2.35	$2.35	$2.35	$1.37
Beams, Chgo.	3.30	2.79	2.69	1.59
Beams, Pittsburgh, contr.	2.20	2.60	2.50	1.41
Beams, Philadelphia	2.859	2.759	2.659	1.609
Tank plates, Pbgh., contract	3.00	2.95	2.86	1.42
Tank p'ates, Chicago	3.50	3.19	3.09	1.55
Tank plates, Philadelphia	3.909	3.909	3.909	1.609
Sheets, blk., No. 28, Pbgh.	3.25	2.88	2.90	2.05
Sheets, blue an., No. 10, Pbgh.	3.00	2.92	3.00	1.00
Sheets, galv., No. 28, Pbgh.	4.50	4.225	4.37	3.50
Wire nails, Pittsburgh	2.60	2.60	2.50	1.76
Conne'lsville fur. coke, contr.	3.25	2.48	2.42	2.25
Connellsville fdy. coke, contr.	4.50	3.25	3.15	2.48
Heavy melting steel, Pbgh.	18.00	16.12	16.25	14.00
Heavy melting steel, east'n Pa.	15.50	15.00	15.25	15.00
Heavy melting steel, Chgo.	16.50	15.50	14.15	11.56
No. 1 wrought eastern Pa.	22.00	21.00	19.75	16.00
No. 1 wrought, Chgo.	17.50	16.65	13.95	10.68
Rerolling rails, Chgo.	18.25	16.90	15.70	13.25
Car wheels, Chgo.	12.00	12.00	12.25	11.75

(For Additional Prices See Page 754.)

Export Shipments of Pig Halted

Orders Not to Load Until Further Notice on Account of Submarine Warfare —British Government May Take Care of Insurance on Southern Iron

Pittsburgh, Oct. 10.—The activity of the Imperial government's undersea craft in the channels of commerce through which thousands of tons of American pig iron and finished steel products have flooded, has tended to excite exporters of pig iron. One of the leading eastern trunk-line carriers has declared an embargo against the shipment of material for export and a number of pig iron shippers have received instructions by telegraph not to load any additional iron for shipment abroad until further notice. Sharp advances in insurance rates almost have prohibited the shipment of war material to entente nations. It is understood, however, that the British government is making arrangements to pay the war risk on a heavy tonnage of pig iron recently purchased in the south.

The domestic pig iron market steadily is advancing toward higher price levels. Bessemer pig iron has advanced to $23 and basic, foundry and malleable to $20, valley. Further advances are imminent. The Trumbull Steel Co., Warren, O., which has completed arrangements for a new steel works, is reported to have purchased 36,000 tons of basic iron for shipment next year; 10,000 tons were obtained at $19, valley, and 26,000 tons at $20, valley, according to information from a reliable source. A pig iron broker has paid $23, valley, for 10,000 tons of bessemer iron, and a sale is noted of 3,000 tons of the same grade at $23. The Bethlehem Steel Co. has entered the market for from 12,000 to 15,000 tons of high-silicon bessemer iron for shipment in November, December and January. The Andrews Steel Co. is closing for from 1,000 to 1,500 tons of bessemer iron for prompt delivery. Scattering lots of No. 2 foundry and malleable iron have been sold at $20, valley, and gray forge iron is being held at $19.50, valley.

Bethlehem's Inquiry

Cleveland, Oct. 10.—The most interesting feature of the pig iron market this week is the appearance of the Bethlehem Steel Co. in this market with an inquiry for from 12,000 to 15,000 tons of bessemer, analyzing 2 to 2.25 per cent silicon, for delivery at the rate of 4,000 to 5,000 tons per month beginning November. The fact that the high freight rate from Cleveland to South Bethlehem has not interfered with the inquiry being sent to this district is evidence of the difficulty of obtaining the iron in eastern territory. The tonnage is not very attractive on account of the high silicon content and at least one important interest has declined to quote. The Andrews Steel Co., Newport, Ky., usually a buyer of basic, is in the market for 1,000 tons of bessemer. The market is very strong but few sales are being made on account of furnaces having very little tonnage to dispose of for delivery prior to July 1 of next year.

Prices Uncertain

Philadelphia, Oct. 9.—Continuing active demand from consumers, coupled with the prospects for advancing costs for the furnaces due to rising coke prices and the outlook for higher ore quotations has produced a rather excitable condition in the pig iron market in eastern territory. There have been frequent overnight changes in furnace schedules, as a number of the makers have endeavored to keep ahead of the actual market since they have not cared to make additional sales while conditions remain so unsettled. Such policies have brought forth quotations of $21, eastern Pennsylvania furnace, for No. 2X, for this year, and $22 for second quarter. The real market level on some grades, notably foundry, is rather difficult to fix, but $20.25 to $20.75, Philadelphia, for No. 2X seems about the immediate range. The lowest

(*For complete prices see page 754.*)

eastern Pennsylvania prices now appear to be around $19.50, furnace. Virginia makers are firming up on their schedules and the $17.50 price for No. 2X is not so readily forthcoming. Early advances are expected in that district

Alabama furnaces continue to sell considerable iron in this district, one maker taking 4,000 tons this week, and little is heard of quotations below $15, Birmingham. One producer is asking $15.50, Birmingham basis. Miscellaneous sales in this district have not been as heavy as a week ago, probably due to the higher prices. Delaware River pipe works bought several thousand tons additional, principally Alabama low grade. Pipe iron now is around $18.50, delivered. A Lynchburg, Va., pipe foundry considered the purchase of 5,000 tons, but did not buy. Two lots totaling 2,500 tons of foundry for second quarter were inquired for. An eastern Pennsylvania iron mill is out for 1,000 tons of forge.

Standard low phosphorus iron is continuing its rise and has been sold in tonnage lots as high as $40, eastern furnace. This grade now is quoted from $37 to $40, Philadelphia basis. The week's sales were about 8,000 tons. Lebanon low phosphorus is quoted at $35, furnace, by one maker. Basic is quiet, but is quoted higher at $20.50 to $20.75, delivered eastern Pennsylvania.

Chicago Market Strong

Chicago, Oct. 10.—All grades of pig iron entering the Chicago market are decidedly stronger and higher quotations are ruling in some grades. Following the increase in quotations on Lake Superior charcoal iron, makers of malleable advanced 50 cents per ton to $19.50, furnace, while northern No. 2 foundry has firmed up to $19, furnace. At the same time, southern iron is quoted by most makers at $15.50 for first quarter or first half with some interests offering nothing under $16. Inquiry for all grades is heavy and sales continue large, which is one factor in increasing quotations.

Demand for iron to go into export continues active and eastern interests handling foreign orders stand ready to take as much tonnage as western furnaces are able to supply of bessemer iron of almost any analysis.

Southern interests have sold heavy tonnages of basic iron for export, an estimate of 150,000 tons of this grade being made by a conservative observer.

One maker of Jackson county silveries has increased its quotation to $28, furnace, while some others are continuing at $27, furnace.

The situation, with heavy sales and strong demand for export, seems ripe for further advances and buyers appreciate that they must cover their requirements or run the risk of being left out of furnace schedules.

Buffalo Prices Stiffen

Buffalo, Oct. 10.—Sales of 18,000 to 20,000 tons of all grades during the week, the elimination of the last of the resale iron, the sold-up condition of the furnaces and the continuance of a general demand for iron has caused the producing interests to stiffen their prices. One furnace that had been taking on some tonnage at $19 minimum, today advanced its price to a fixed minimum of $19.50, so that at the present time that is the bottom available price for No. 2X foundry and the price is more nearly $20. The market for the early part of this week may be quoted at a range of $19.50 to $20.50 with a tendency towards a further stiffening.

While considerable of the inquiry is for needs over the remainder of the year, the furnaces are sold up to such an extent that fully 95 per cent of the tonnage booked is for delivery over the first half of 1917.

Very Active in South

Birmingham, Ala., Oct. 9.—Unusual activity characterized the pig iron situation in the Birmingham district the past week and speculation is rife as to the probable base price of foundry iron within the next month, at least. Between 35,000 and 37,000 tons per month of basic iron is being produced for consumption outside the district. In past normal years, this tonnage represented foundry iron. Two additional furnace stacks have been put in commission on basic iron for export delivery, and more than 100,000 tons of basic iron was booked by one large producing interest at one "clip" for this business, as reported in *The Iron Trade Review* last week. In addition, another interest booked between 40,000 and 50,000 tons of basic. Prices were between $14 and $15 per ton, f. o. b. cars furnace. Fully 75,000 tons of foundry iron were sold during the week by the different interests on the basis of $14.50 and $15 per ton at the furnace. Pig iron production in the state has been raised from the 218,000-ton class per month to 235,000 tons, and on this basis the close of the present year will witness a production at the rate of 2,800,000 tons per year—whereas the most sanguine expectations, heretofore, were 2,600,000 for the year. The base price has crystalized between $15 and $15.50 per ton for next year's deliveries, both for foundry iron and basic. There are only two more "possible" stacks in the state for operation, and there is strong belief that before the end of the year improvements will be under way preparatory to blowing them in on foundry iron and possibly basic.

Insurance Advanced

New York, Oct. 10.—No statement may be ventured at this time as to what effect a continuance of the German submarine menace to shipping may have upon the export traffic in pig iron from this port, especially with the belligerent nations which have been large buyers. The first effect of this development has been to upset shipping conditions by advancing insurance rates several hundred per cent and by the holding of many vessels, in port, temporarily, at least. Exporters and pig iron sellers are following the situation with much interest. New export inquiries have been coming forward as freely as ever. Holland, whose purchases during the past month or six weeks now are placed at 25,000 tons of foundry and several thousand tons of steelmaking grades, is inquiring for 10,000 tons additional, principally foundry. Italy asks 10,000 tons of bessemer for November and December. For France, 10,000 tons of low phosphorus remain open. Exporters find bessemer is hard to obtain, especially for early shipment.

On the domestic side, the market is rather feverish and more erratic, as various producers have been advancing prices quite rapidly. At Buffalo, $21 for either No. 2X or basic now is quoted by one maker. Some eastern Pennsylvania quotations for No. 2X are $21 to $22, furnace. The tidewater market is higher and $20.50 to $21 for No. 2X apparently is the minimum range. Buying is fairly heavy. A Bridgeport, Conn., buyer closed on an inquiry for 2,000 tons of foundry. A Newark consumer took 1,000 tons of Virginia No. 2X. A New Jersey soil pipe maker has been figuring on 3,000 tons. A Perth Amboy, N. J., steel works bought 3,000 tons of fourth quarter basic from Buffalo. Eastern Pennsylvania iron was quoted at $20.75, delivered, on this business. Some Buffalo iron has been sold for the third quarter of next year at $19 to $19.50, for No. 2X.

Selling Less Active

Cincinnati, Oct. 9.—Sales of pig iron in this territory are not as heavy as during the past two weeks. Orders are being taken almost wholly through direct solicitation, general in-

(*For complete prices see page* 754.)

quiry being very light. The only sale of importance reported recently is 5,000 tons, divided between northern and southern foundry grade, to a Marion, Ind., melter, for first half delivery.

The situation is strong. The tendency of prices is upward. Some Tennessee iron is still available at $14.50, Birmingham basis, for the last quarter of this year, and the lowest price for the first half of next year is $15, for either Alabama or Tennessee makes. Alabama stacks are usually asking from $15.50 to $16, for any delivery from the present time up until July, 1917. Southern basic iron has been selling in large lots recently for export shipment, the English government in having purchased 100,000 tons from the Sloss Sheffield Steel & Iron Co., which will put two stacks upon this grade at once. The Woodward Iron Co. already has two stacks making basic iron. It is understood that most of this southern basic has been sold between $14 and $14.50, Birmingham basis, and that the English government will purchase 100,000 tons more, if a price of $14, Birmingham basis, can be had. Very little southern Ohio basic iron is available, as practically all furnaces in that district are sold up until the last half of 1917. Bessemer iron is also scarce, as southern Ohio furnaces have sold large tonnages of this grade for export shipment during the past three weeks. The price of southern Ohio No. 2 foundry iron is given from $19 to $20, Ironton basis, for the first half of next year.

Quiet, But Firm

St. Louis, Oct. 9.—While inquiries for pig iron are small for tonnages and few in number, prices are advancing, the market is firm in this district, and local sales agents are confident that business is on the eve of improvement. Southern No. 2 has advanced to $15.50, Birmingham, for any delivery up to July 1, next. Northern iron is firm at $19, Chicago, and $20, Ironton.

Cold Rolled Strip Steel

Pittsburgh, Oct. 10.—Pressure for cold rolled strip steel for shipment next year is heavy and it is likely that books for first and second quarter delivery will be opened at an early date. Mills continue to ask from 6c to 6.50c on contracts.

Westinghouse interests have purchased a tract of about 500 acres in Tinicum township, Delaware county, Pa., and will erect a plant for building steam turbine marine engines.

Coke Market is Active

Numerous Contracts for Furnace Fuel Made—Prices on Connellsville Product Advance Rapidly

Philadelphia, Oct. 9.—Much activity has been shown in the furnace coke market in this district during the past week or 10 days. A number of contracts for next year have been closed by eastern Pennsylvania consumers. One of these called for 100,000 to 150,000 tons for first half and all year. Among the other contracts was one for first half at $2.75, Connellsville ovens; another at $3 and a third at $3.25. The lowest price transaction was closed in the early stages of the buying movement. The Midvale Steel & Ordnance Co. has closed for its partial requirements and still is inquiring for furnace fuel as well as 1,500 tons of heating coke. Another furnace interest outside this district took 60,000 tons for first half at $3.50, ovens. Backwardness of shipments, presumably due to car and labor shortages, is causing consumers much inconvenience and four different eastern furnaces were forced to bank at intervals. Considerable spot buying has resulted and both $4 and $4.25, ovens, was paid in this district the past week.

Inquiry from Southern Ohio

Cincinnati, Oct. 9.—A southern Ohio blast furnace is inquiring for between 35,000 and 40,000 tons of coke for delivery beginning late in 1916, and running into the first half of 1917. Other southern Ohio stacks are also reported to be sounding the market for prices on coke, but have not put out definite inquiries. Blast furnaces throughout the south appear to be well covered until the last half of 1917. Selling of foundry coke is light, but shipments on yearly contracts are heavy and in a large number of cases are larger than specifications. Wise county and Pocahontas furnace coke are quoted from $3 to $3.25, ovens, and New River foundry grades are given from $3.25 to $3.50, ovens.

Connellsville Coke Higher

Pittsburgh, Oct. 10.—Despite the rapid development of the by-product oven industry, Connellsville coke has showed further evidence of its ability to "come back" this week. Blast furnace fuel for spot delivery has sold at $4.25, ovens, and foundry coke for immediate shipment is being held at $5, ovens, by leading sellers. The contract market gradually is gaining in strength. Some tonnage has been sold at $3.25 and several important cokemakers are asking $3.50 and even $4, ovens, for shipment the first half of 1917. The Cambria Steel Co., Johnstown, Pa., has bought enough coke to operate two of its furnaces at a price less than $3, ovens, for shipment all of next year. The Andrews & Hitchcock Iron Co., Hubbard, O., has not yet closed on its inquiry for 24,000 tons a month for first half delivery. Several other inquiries for contract fuel are pending. *The Connellsville Courier,* for the week ending Sept. 30, says production was 412,364 tons, compared with 404,600 tons the week before. While the Connellsville fields have been producing coke at the rate of about 400,000 tons a week, yet somewhat of a scarcity of coke is reported.

By-Product Plant

Cleveland, Oct. 10.—The new plant of the Dover By-Products Coke Co., Dover, O., a company closely affiliated with M. A. Hanna & Co., has been placed in operation and is making about 400 tons of coke per day. This coke will be sold for domestic use until the blast furnace of the Penn Iron & Coal Co. is placed in operation next December.

By-Product Activity

St. Louis, Oct. 9.—Connellsville, New River and Wise County foundry grades of coke have risen in prices to $4 a ton, and the market is very firm. Inquiry for by-product coke is good, and some dealers are out of the market on domestic grades. Domestic grades have advanced to $5.50, St. Louis, and foundry grades are strong at $7.

(*For complete prices see page* 754.)

Barbed Wire

Is Inquired for by Russia—Other Nations in Market.

Pittsburgh, Oct. 10.—The American Steel & Wire Co. has made no change in its prices since Aug. 7, and continues to quote wire nails at $2.60 a keg and plain wire at $2.55 per 100 pounds. The general trade has been looking for an advance in the prices of all wire products since Sept. 30. Specifications against contracts have been very heavy this month, it being apparent that jobbers are being called upon for huge quantities of material for purely domestic work.

Still Clamoring for Plates

Tonnage Estimated at 300,000 Pending From Ship Builders and Demand From Other Sources is Active

Philadelphia, Oct. 9.—Demands for ship building material continue to flow in upon eastern mills in tremendous tonnage from both domestic and foreign buyers. A new English inquiry calls for 40,000 tons; a domestic yard wants 15,000 tons; the Chester Ship Building Co., 2,500 tons for first half; the Pennsylvania Ship Building Co., an additional tonnage for next year, and there is a long list of other inquiries which are new or have been pending for several weeks. The total of all these matters is put by one maker at not less than 300,000 tons, this including the government naval program. The four battle cruisers which will be bid upon Dec. 6 will add 75,000 to 80,000 tons to the government tonnage already in the market.

Liberal inquiries also continue to come out from other large buyers of plates including car and locomotive builders, bridge shops, etc. For New York Central bridge work, 4,500 tons of plates are wanted. New sales are fair but not so heavy since buyers are not able to get anything except very belated deliveries and several of the mills are inclined not to accept new business unless it is of the most specific nature. One maker took about 10,000 tons of new business in the week. Prices are firmer and 3.50c, Pittsburgh, now is the lowest figure on limited widths and on universals. Wide plates command 4c, Pittsburgh base, without trouble. Small sales have been made at 4.50c, Pittsburgh and certain foreign buyers now will pay that price.

Plates Climb Higher

Pittsburgh, Oct. 10.—The unfilled tonnage report of the United States Steel Corporation made public today showing a decrease, failed to cast even a slight shadow of gloom over the trade, since it generally is known that all manufacturers of semi-finished and finished steel products recently have been turning down more business than they have been accepting, on account of the impossibility of making deliveries before the latter part of the second quarter of 1917. Of the 20,000 steel cars involved in pending inquiries, referred to a week ago, orders for 10,000 tons have been placed. Makers of car material have submitted bids on about 150,000 tons in the aggregate. In addition to this tonnage, thousands of tons of ship material are required for the building of merchant and government ships on the Atlantic and Pacific seaboard.

One leading independent manufacturer has advanced its price of steel plates to 3.25c for delivery at its convenience. The Carnegie company, however, has not withdrawn its 3c price, although that figure is regarded as somewhat nominal, in view of the fact that it is being offered only for delivery at the convenience of the maker.

Price Not Important

Buffalo, Oct. 10.—Mills and agencies report that the demand for plates, particularly in commercial sizes, is so far in excess of the supply that the matter of price is absolutely secondary to the question of deliveries. The majority of the producers are reported as quoting 3½c per pound with no tonnages to offer consumers, as the mills are booked solid for a year in advance and in many instances to the end of 1917. Where reasonably early shipments have been assured, prices as high as 5½c have been secured for small lots.

Plates for Japan

New York, Oct. 10.—Japanese ship yards continue to take large tonnages of material from American mills and as they are having increased trouble to place their orders because of mill congestion, they are making their orders more attractive. Some of these buyers now have offered 4.50c, Pittsburgh, for ship steel. Ansano & Co., operating large yards near Tokio, recently placed a new order for forward delivery for 6,000 tons of plates with the Lackawanna Steel Co.; 6,000 tons of plates with the Inland Steel Co. and 6,000 tons of shapes with the Phoenix Iron Works. Prior purchases by this yard from the Steel Corporation and other mills had amounted to about 40,000 tons.

Hard to Get

Chicago, Oct. 10.—Steel plates continue in heaviest demand and consumers are bending every effort to place tonnages for any delivery possible. Most mills are unable to take business of this sort except for delivery far into the future, but consumers apparently believe that they must place their orders now and specify early in order to keep a supply moving in their direction through future months. The quotation remains at 3.19c, Chicago mill, and consumers are anxious to place business at this figure. Mills which have not made long time contracts and are in position to give reasonable delivery are obtaining a premium and some sales have been made for first half delivery at 4.19c, Chicago, and even better prices.

(*For complete prices see page* 754.)

Iron Ore Prices

Must Advance Sharply to Cover Much Higher Costs

Cleveland, Oct. 10.—Shipments of iron ore from Lake Erie docks and Detroit last month amounted to 4,937,462 tons and the tonnage left on dock Oct. 1 was 7,230,024 tons, compared with 7,985,986 tons a year previous. During the past few days there has been considerable complaint concerning car shortage at lower lake ports, but the supply of cars was better Tuesday than on Monday and, on the whole, the movement of ore from docks to furnaces was heavy for this time of the year.

Port.	September, 1916.	September, 1915.
*Buffalo	1,039,646	1,063,688
Erie	202,179	149,917
Conneaut	1,399,508	1,257,147
Ashtabula	1,880,508	1,478,179
Fairport	349,331	312,354
Cleveland	1,707,268	1,279,449
Lorain	715,960	617,467
Huron	271,781	128,135
Toledo	254,779	273,413
Detroit	50,591	91,227
Total	7,871,551	6,650,976

*Includes Port Colborne.

Possibilities as to iron ore prices for next year are being considered in an entirely informal way. It is estimated that additional costs, owing to higher wages, higher charges for powder and other supplies will amount to 30 cents per ton. Another factor to be kept in mind is the higher royalties which will result from higher ore prices, as in many cases the royalties are 10 per cent of the price of ore on sliding scale contracts. It is also fully expected that the ore carrying charge will be advanced not less than 30 cents per ton and it will not be at all surprising if ore prices for 1917 are $1 per ton higher than for this year.

The Standard Screw Co., Corry, Pa., recently purchased the plant of the Corry Novelty Co., which has been equipped for the manufacture of turnbuckles, bolts and nuts. L. T. McElroy, of Corry, is manager of the plant.

Highest Tin Plate Price

In History of the American Industry is Named by Independents for First Half of Next Year

Pittsburgh, Oct. 11.—A price of $6, base, for bessemer coke tin plate, 100 pounds, f. o. b. mill, for first half of next year, was named last Friday by the Phillips Sheet & Tin Plate Co., with works at Clarksburg and Wierton, W. Va., and Steubenville, O., and several other independent companies quickly followed suit. Since that time, the selling of tin plate at this price, which is the highest in the history of the trade, has been going on, although the American Sheet & Tin Plate Co. has not yet formally opened its books.

Sales representatives of the American company have been in Pittsburgh for two days, talking about the general business situation. It is understood that the leading interest will apply new contracts for tin plate more rigidly than ever before. Consumers will be asked to guarantee to take out all the tonnage for which they contract and no material will be sold for shipment after July 1, next. The American company has not intimated what its price will be.

There has been no great scramble for tin plate since independent concerns opened books last Friday, although the absence of excitement is not due to the high price of material. Most consumers, as has been known for some time, made reservations for their estimated requirements some time ago, giving the seller the privilege of inserting the price just as soon as the market for 1917 shipment was opened formally.

Because of the tremendous demand for material, most concerns are allotting tonnages as equitably as possible. Some concerns will not be able to obtain as much material as they hope to secure, unless they succeed in placing contracts with several different manufacturers.

Steel Bar Prices

Show an Upward Tendency—So Do Steel Bands

Philadelphia, Oct. 9.—One large maker of steel bars is maintaining his price at 2.75c, Pittsburgh, but is not making many sales, as his customers are under contract for the current quarter. Another large independent is quoting 2.70c, Pittsburgh. Other mills still name 2.60c, Pittsburgh, but they have not changed their policy of taking on no new contracts except in isolated cases. There are plenty of buyers, however, who would like to place contracts for the first half and this tonnage is considerable. Some sales of reinforcing bars rerolled from shell steel discards at 2.75c, eastern Pennsylvania mill, are noted.

Chicago Market Strong

Chicago, Oct. 10.—Although steel bars are not in as great demand at present as plates and shapes, as is indicated by the difference in quotations, bars being held at 2.79c, Chicago mill, while shapes are $2 per ton higher and plates $8 per ton higher, there is no lack of demand for this class of finished material. New business being taken by steel mills continues in excess of shipments and is being taken by the leading interest on contracts specifying no delivery except at convenience of the mill. This probable delivery date is becoming more and more deferred under heavy selling and this is counted on to bring an end to present demand in the near future.

The leading independent has retired definitely from the market and announces it will not accept any further tonnage, as its entire supply of raw steel is already provided for through the entire first half of 1917. Its policy is not to sell at present for last half delivery, although some tonnage now on the books may be delayed in delivery until after the middle of the year.

Hard steel bars continue to be firm at 2.50c, Chicago mill, but increasing scarcity of rerolling rails and inability to obtain soft steel bars are expected to bring about a higher quotation before long.

Bars Held at 2.70c

Pittsburgh, Oct. 10.—One of the independent manufacturers has advanced its price of steel bars $2 a ton to 2.70c for shipment at its convenience. Structural shapes, it will be recalled, were advanced to 2.70c a couple of weeks ago by the Carnegie Steel Co., but no change in the price of steel bars has been made by the leading interest. Heavy tonnages are being shipped to factories in this country and abroad for the manufacture of munitions and the purely domestic situation is regarded as more satisfactory than ever. Iron bars are commanding 2.65c and above.

Bar Iron Firm

Chicago, Oct. 10.—Good business is being done in bar iron with excellent demand, some makers sold up for the remainder of the year and taking some tonnage for delivery during first quarter of 1917.

Although the market is represented by a quotation of 2.35c, Chicago mill, as business can be placed at that figure without difficulty, some mills which are sold well into the future are refusing business under 2.40c, Chicago mill, and expect to realize that figure. On the other hand, some business for 1917 is being taken at the lower level.

Shafting Firm

Pittsburgh, Oct. 10.—The 20 per cent off the list price has not yet been withdrawn by all makers of cold rolled steel shafting, although indications are that the market soon will be established at 15 per cent off the list as a minimum. Some manufacturers now are asking 10 per cent off the list for future delivery.

Hoops and Bands

Pittsburgh, Oct. 10.—It is likely that steel bands will be put up $2 a ton at an early date, since some sellers of steel bars now are asking 2.70c for shipment at their convenience, or $2 a ton above the previously prevailing quotation. Steel hoops are quoted at 3c for future delivery. More important manufacturers have sold enough tonnage to enable them to maintain present operating rates for almost a year.

(*For complete prices see page* 754.)

Warehouse Prices on Sheets

Cleveland, Oct. 10.—Warehouse prices of sheets have been advanced and No. 28 galvanized are now quoted at 4.80c, compared with recent quotations of from 4.40c to 4.75c, while No. 28 black is quoted at 3.50c and No. 10 blue annealed, 3.70c, advances of $2 and $4 per ton, respectively. These advances are in harmony with the stronger position of the mills, following the improvement in demand.

Warrants Active

New York, Oct. 10.—Northern pig iron warrants have been more active at higher prices. This has been especially true of Cleveland warrants, on which an advance of $1 has been paid. Considerable inquiry for Alabama warrants is current, but these cannot be had under $15 and are getting scarce. Alabama warrants now are quoted at $14.25 bid, and $15 asked, for No. 2 foundry at the warehouse in the Birmingham district.

Shapes for Bridges

Are Large Part of Recent Awards—Big New York Building.

New York, Oct. 10.—A large part of the new structural work now offering is being supplied by the railroads, which bears out the expectations of leading fabricators expressed recently. Railroad bridge inquiries in the east are liberal and including the large span for the New Haven over the Thames river, exceeding 10,000 tons in total at present. More work of this kind is expected to come out constantly. The New York Central interests are preparing to take bids on an unusually large office building in the terminal zone, this city, estimated to require 15,000 to 20,000 tons, and some of the shops, anticipating this, are seeking mill protection on the steel. Only a modest number of new projects or awards is shown in general building lines in this district. Shape prices are strengthening steadily. It is evident that some of the mills with diversified production are not anxious for shape orders from the fact that one eastern maker is said to be losing $20 on each ton of shapes booked. This is the valuation placed on the steel if rolled in other forms. Shapes are quotable from 2.70c to 2.85c, Pittsburgh, or 2.869c to 3.009c, New York.

Still Advancing Prices

Philadelphia, Oct. 9.—Price advances among eastern structural shape mills are continuing. Both the Cambria and Bethlehem Steel companies now are naming 2.85c, Pittsburgh, and other eastern mills quote a range from 2.70c to 3c, Pittsburgh, depending on the buyer, tonnage, delivery, size, etc. New tonnage or producers' books makes a very good showing and specifications are active. Some holders of last half contracts as far back as several weeks ago had specified these tonnages in full. Deliveries vary according to the size of the section. The largest demand is for the lighter shapes or under 5 inches and March and April are being promised on these by some of the mills. Heavier sections can be had much more readily, sometimes in a few weeks. The Phoenix Iron Works has received 6,000 tons of ship shapes from a Japanese yard. The Chester Ship Building Co. is inquiring for 800 tons. Bulb angles take a $6 per ton premium over standard shapes.

Trumbull Awards Contract

Pittsburgh, Oct. 10.—A number of interesting structural contracts have been placed this week. The Trumbull Steel Co., Warren, O., has awarded contracts to the Riter-Conley Mfg. Co. for about 5,000 tons for its new steel works. The McClintic-Marshall Co. has taken about 5,000 tons for a machine shop for the United States government at the Norfolk navy yard and will furnish 800 tons for the Neville Island bridge of the Pittsburgh & Lake Erie railroad. Structural shapes are being held at 2.70c for delivery at the convenience of the mill.

Shape Demand Heavy

Chicago, Oct. 10.—The advance of $2 per ton on structural shapes last week bringing the mill price to 2.89c, Chicago mill, indicates the heavy demands being made for this class of material. Although construction work on buildings is taking much steel in its form, the strongest feature of the market is demand for ship building and car building. Sales of practically 10,000 cars by western makers during the past week call for approximately 100,000 tons of steel for this purpose.

Chicago Terminal

Cleveland, Oct. 10. — Cleveland structural shops are figuring on the steel for the Harrison street terminal of the C., B. & Q. and Pennsylvania railroads, at Chicago, which will require 10,000 tons of steel. The policy of the steel companies on the plain material has not yet become known, but quotations will probably be made in a few days.

CONTRACTS AWARDED.

Chicago & Northwestern Railway Co., ore spouts for No. 3 dock at Ashland, Wis., 1,076 tons, to American Bridge Co.

The Pullman Co., machine shop and section of yard crane runway at Pullman, Ill., 1,284 tons, to Kenwood Bridge Co.

Sugar mill in Cuba for the Cuban-Portland Cement Co., 500 tons, to a Havana fabricator.

Bridge work for the Baltimore & Ohio railroad, 800 tons, of which 700 tons went to the Fort Pitt Bridge Works and the remainder to the Toledo-Massilon Bridge Co.; 550 tons also placed with other independent shops.

Office building, Lima, Peru, for W. R. Grace & Co., 350 tons, to Milliken Bros., Inc.

Addition to the South Ferry building, New York, 250 tons, to the Passaic Structural Steel Co.

Warehouse for Baker & Williams, Morton street, New York City, 400 tons, to Levering & Gerrigues.

Jewish Center, Eighty-sixth street, New York City, 300 tons, to the Hinkel Iron Works.

Apartment for Jos. Paterno, 104th street and West End avenue, New York City, 800 tons, to the Passaic Structural Steel Co.

Loft building, Thirty-ninth street and Seventh avenue, New York City, 350 tons, to Geo. A. Just.

Waterside power station for the Philadelphia Electric Co., Chester, Pa., 5,000 to 10,000 tons, understood to have gone to Levering & Gerrigues.

Southern hotel, Baltimore, 1,100 tons, to Dietrich Bros.

CONTRACTS PENDING.

New York State Barge Canal, bridge at Rochester, taking 350 tons structural, bids opened at Albany; also on various canal structure contracts requiring 1,600 tons structural and large tonnage reinforcing material and steel sheet piling.

City of Buffalo to open bids next week on repair work various grade crossing viaducts in city, requiring 1,000 tons structural and 1,000 to 1,200 tons iron plates.

Bridge work for the Central Railroad of New Jersey, 1,200 to 1,500 tons, including a large span over the Manasquan river, bids being taken.

Sugar mill for Hayti, 1,000 tons or more, early award expected.

Four bridges for the Pennsylvania railroad, about 1,500 tons, bids being taken.

Train shed for the Central Railroad of New Jersey at Newark, 1,200 tons, bids being taken.

Addition to the Watervliet Arsenal, Watervliet, N. Y., 600 tons, bids being taken.

Loft building, 43-51 West Thirty-sixth street, New York City, for the Nameloc Co., 1,200 tons, bids being taken.

Bridge work for the Lehigh Valley railroad, 200 tons, bids being taken.

Loft building for the Union Square Building Corporation, Union Square, New York City, 800 tons, bids being taken.

Freight house for the Burlington railroad at Chicago, 5,000 to 6,000 tons, bids being taken.

Large office building for the New York Central railroad, in terminal zone, New York City, 15,000 to 20,000 tons, bids soon to be taken.

Addition to the plant of the Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., about 5,000 tons, bids soon to be asked.

(*For complete prices see page 754.*)

Pipe Projects

Are Under Consideration—Boiler Tubes Are Strong.

Pittsburgh, Oct. 10.—Specifications for oil country goods are extremely heavy and some mills virtually have withdrawn from the market for shipment before July 1, next. Several important pipe line projects are under consideration, but no large orders have been placed this week. Demand for merchant pipe is fairly active, although the pressure for smaller sizes is not nearly so heavy as it is for lap welded material. The market for boiler tubes reflects strength. Premium prices are being paid for iron and steel boiler tubes for early shipment.

The Hannevig & Johnson Co., of New York, has acquired control of the Delaware Shipbuilding Co., of Seaford, Del. The plant property comprises 12 acres. It is proposed to repair and build wooden vessels at this yard. A. D. Cummins, of Philadelphia, president of the Delaware Shipbuilding Co., has retired.

Active Foreign Demand for Sheets

Adds Greatly to Strength of Market—Large Tonnage Sold for Shipment to England—Prices Advancing

Youngstown, O., Oct. 10.—In the same manner that the demands growing out of the war strengthened most lines of other finished steel products months ago, an influx of foreign buying is now adding great strength to the sheet market. In the past 10 days, sheets have jumped $5 a ton, while premiums as high as $10 above the present market level are being paid.

This foreign demand comes largely from England and it is estimated that from 25,000 to 30,000 tons have been sold in the past three weeks for delivery in Great Britain. The heavy domestic demand that developed early in September had taken a large part of the tonnage for fourth quarter delivery, and the foreign demand has been satisfied from that remaining unsold. The result is that a limited tonnage is now available for delivery during this quarter and it is on this tonnage that present advanced prices are being obtained.

An explanation of the British demand is found in the fact that semi-finished steel is required more urgently in England for shellmaking purposes. English sheet producers first attempted to secure American sheet bars, but in competition with their own munition plants, they were unsuccessful. Now they are buying finished sheets. Sheet producers previously had benefited little from a direct war demand.

An interesting example of the eagerness with which foreigners are buying, is afforded by the record of sales between one producer and an eastern exporting firm. The initial trial order was taken at 3c, 250 tons being purchased on an inquiry for 2,000 tons. Satisfied with the delivery, the exporters specified the remainder, or 1,750 tons, at 3c, and paid 3.25c for an additional 2,000 tons. Since then, another 2,000 tons have been sold at 3.50c and the mill has quoted 3.75c on a fourth order for the same tonnage.

Sheet producers are now reluctant to contract far ahead. The cost of first quarter sheet bars is uncertain and sheet mills are generally inclined to wait until their costs are certain before contracting. The submarine flurry also is arousing a tendency to go slow on future business.

A number of sheet producers in the country are sold out for fourth quarter delivery. The country's leading interest is understood to be practically out of the market on both black and galvanized sheets. Mills with limited tonnages for sale are holding at various prices from 3.25c to 3.75c, quotations of 3.50c to 3.75c for black being frequently made. A large tonnage was sold this week at 3.50c. The market, however, is quotable at 3.25c, although one mill which produces a limited tonnage of black sheets has not withdrawn its 3.15c quotation.

Galvanized sheets also are being quoted at a wide spread, ranging from 4.50c to 5c. Many mills are practically out of the market while others with a limited tonnage are asking prices well above present quotations. One order for 200 tons at 4.50c was refused yesterday and it is doubtful if any considerable tonnage is obtainable at that figure.

Blue annealed sheets are fairly active and are being quoted at from 3c to 3.25c. The present strength of the black sheet market has brought about a more normal relation between blue annealed and black sheets. Some months ago blue annealed sheets were quoted higher than black sheets, the present reversal of that position bringing them back to a normal relation.

Black Sheets Higher

Chicago, Oct. 10.—No. 28 gage black sheets are now held generally at 3.29c, Chicago. The leading independent producer in this market is now definitely out as far as selling is concerned, not because of heavy sales of sheets so much as because of a lack of raw steel to supply its sheet mills. This action tends to strengthen the market, as it throws present demand principally into the hands of smaller independents, the leading interest having orders covering its operation far into the future. Blue annealed sheets remain unchanged at 3.19c, Chicago, for No. 10 gage.

Prices Higher

Cleveland, Oct. 10.—The sheet market is very much stronger, especially as to box annealed, No. 28 being quoted at 3.15c to 3.25c. On blue annealed, 3c can still be done.

Sheets Stiffen in East

Philadelphia, Oct. 9.—Blue annealed sheets after their recent irregularity have stiffened and now are firm at 3c to 3.25c, Pittsburgh, for No. 10 gage in this territory. New buying is heavier. Eastern makers have been taking first quarter contracts, but have declined to go through the second quarter, for which there is some inquiry.

Slight Change

In Unfilled Tonnage of U. S. Steel Corporation.

New York, Oct. 10.—Operations of the Steel Corporation in September resulted in a decline of 137,733 tons in the total unfilled orders, as set forth in the monthly statement issued today. The unfilled orders as of Sept. 30 were 9,522,584 tons, compared with 9,660,357 tons on Aug. 31. The change is so small relatively as to be of slight significance.

The unfilled orders of the Steel Corporation at the close of each month in recent years, showing the changes in tonnage and per cent are as follows:

Date.	Total.	Change, tonnage.	Change, per cent.
Sep. 30, 1916....	9,522,584	137,133—	1.42—
Aug. 31, 1916....	9,660,357	66,765+	.69+
July 31, 1916....	9,593,592	46,866—	0.48—
June 30, 1916....	9,640,458	297,340—	3.09—
May 31, 1916....	9,937,798	108,247+	1.11+
Apr. 30, 1916....	9,829,551	498,550+	5.34+
Mar. 31, 1916....	9,331,001	762,035+	8.89+
Feb. 29, 1916....	8,568,767	646,199+	8.16+
Jan. 31, 1916....	7,922,767	119,547+	1.53+
Dec. 31, 1915....	7,803,220	616,731+	8.58+
Nov. 30, 1915....	7,189,489	1,024,037+	16.63+
Oct. 31, 1915....	6,165,453	847,834+	14.06+
Sep. 30, 1915....	5,317,618	409,163+	8.13+
Aug. 31, 1915....	4,908,455	20,085—	0.04—
July 31, 1915....	4,928,640	250,344+	5.35+
June 30, 1915....	4,678,196	413,598+	9.69+
May 31, 1915....	4,264,598	102,354+	2.46+
Apr. 30, 1915....	4,162,244	93,505—	2.21—
Mar. 31, 1915....	4,255,749	89,622—	2.06—
Feb. 28, 1915....	4,345,371	96,800+	2.28+
Jan. 31, 1915....	4,248,571	411,928+	10.74+
Dec. 31, 1914....	3,836,643	512,051+	15.40+
Nov. 30, 1914....	3,324,592	136,505—	3.94—
Oct. 31, 1914....	3,461,097	326,570—	8.62—
Sep. 30, 1914....	3,787,667	425,664—	10.01—
Aug. 31, 1914....	4,213,331	54,742+	1.32+
July 31, 1914....	4,158,589	125,732+	3.12+
June 30, 1914....	4,032,857	34,697+	0.86+
May 31, 1914....	3,998,160	278,908—	6.98—
Apr. 30, 1914....	4,277,068	376,757—	8.09—
Mar. 31, 1914....	4,653,825	372,615—	7.42—
Feb. 28, 1914....	5,026,440	412,760+	8.95+
Jan. 31, 1914....	4,613,680	331,572+	7.74+
Dec. 31, 1913....	4,282,108	114,239—	2.59—
Nov. 30, 1913....	4,396,347	117,420—	2.60—
Oct. 31, 1913....	4,513,767	490,018—	9.79—
Sep. 30, 1913....	5,003,785	219,683—	4.24—
Aug. 31, 1913....	5,223,468	175,888—	3.03—
July 31, 1913....	5,399,356	407,965—	7.03—
June 30, 1913....	5,807,317	517,005—	8.18—
May 31, 1913....	6,324,322	654,440—	9.38—
Apr. 30, 1913....	6,978,762	490,194—	6.55—
Mar. 31, 1913....	7,468,956	187,758—	2.45—
Feb. 28, 1913....	7,656,714	170,654—	2.18—
Jan. 31, 1913....	7,827,368	104,796—	1.32—
Dec. 31, 1912....	7,932,164	79,281+	1.01+
Nov. 30, 1912....	7,852,883	258,502+	3.40+
Oct. 31, 1912....	7,594,381	1,042,874+	15.33+
Sep. 30, 1912....	6,551,507	388,132+	6.29+
Aug. 31, 1912....	6,163,375	206,296+	3.46+
July 31, 1912....	5,957,079	149,773+	2.58+
June 30, 1912....	5,807,346	56,363+	0.98+

The Standard Screw Co., Corry, Pa., which has just been incorporated with a capital of $20,000, is making turnbuckles for the Curtiss Aeroplane Co.

More Activity in Scrap

Prices of Heavy Melting Advance Rapidly at Cleveland—Increased Demand at Chicago and Other Centers

Chicago, Oct. 10.—Increasing activity is evident in the Chicago market for iron and steel scrap, not only among buyers but among consumers as well. No large tonnages are being figured, but a general movement to increase reserves of scrap is evident all along the line.

Quotations continue to advance, some grades being considerably out of line with usual conditions while some other grades are remaining at comparatively low levels.

Railroads apparently are marketing their summer collections of scrap and an unusual number of lists are now current, including the following: Southern railroad, 3,000 tons; Michigan Central railroad, 2,900 tons; Chicago, Milwaukee & St. Paul railroad, 1,600 tons; Union Pacific railroad, 1,500 tons; George W. Jennings, 1,130 tons; Wabash railroad, 1,100 tons; Mobile & Ohio railroad, 740 tons; the Soo line, 370 tons, and the Kansas City Southern railroad, 265 tons.

Prices Advance

Philadelphia, Oct. 9.—Perceptible strength has been imparted to old material in the district during the past week. A number of grades are up 50 cents. Though eastern consumers are not buying heavy melting steel, the sentimental effect of higher prices for this grade at Pittsburgh and other centers and the covering of brokers has strengthened the market. The brokers have been paying about $18, delivered Pittsburgh, and have raised their offers to $16, delivered eastern Pennsylvania. There has been good buying in wrought pipe by the mills. Rerolling rails are stronger and have become scarce. Both holders of scrap and the dealers are making new sales more cautiously, as they are anticipating higher prices.

Heavy Steel Advance

Cleveland, Oct. 10.—A spectacular advance in the price of heavy melting steel from $16.75 and $17 to $18 a gross ton occurred the latter part of last week, when two leading consumers in this city closed for round tonnages, one taking perhaps 2,000 tons at $16.50 to $17, and the other upwards of 5,000 tons at $18, delivered. Today the market is nominally held at $17.50, as some dealers look forward to a reaction and softening, while others are still inclined to look for higher offers.

Aside from heavy steel, the prices of a majority of other grades have gone through a week of no change, and new sales, if any, were lost in significance in the spurt of the heavy steel scrap. No. 1 busheling and cast iron borings are strong and hard to buy at quoted prices. Awards of heavy steel by a leading railroad in this city have been made on a basis of $18.50 a gross ton, delivered to any point on the lines in central traffic territory.

Higher at Pittsburgh

Pittsburgh, Oct. 10.—All grades of iron and steel scrap continue to reflect strength. Heavy melting steel has advanced to a minimum of $18 and low phosphorus scrap has sold at as high as $22.50 a ton delivered. Other grades reflect similar strength and are quoted at from 50 cents to $1 above prevailing prices of a week ago. Demand for old materials is heavy and it is reported that some of the more important consumers have been buying actively during the last 10 days.

Active at Buffalo

Buffalo, Oct. 10.—Dealers of the Buffalo district report an advancing market, active from the viewpoint of both sales and inquiry. Heavy melting steel is being held at $17 to $17.50 and only small tonnages are being booked at this price as a further advance is expected. Schedules have been advanced on low phosphorus steel scrap, on No. 1 railroad wrought, on old steel and iron axles and other commodities in the list as noted by the schedules. Inquiries continue to come for practically all lines and in good volume.

Strong at St. Louis

St. Louis, Oct. 9.—The scrap market is very strong in this district, principally because of the anxiety of dealers to cover against their contracts, and also because of the activity of rolling mills and steel foundries to increase their reserve stocks. Heavy melting steel is the strongest item on the scrap list and one sale at $18.50 gross ton is reported to have been made last week. Railroad offerings have been unusually light for some months, and this fact leads dealers to believe that a serious shortage is prevailing. This condition also has a tendency to strengthen the market. Railroad offerings before the market for the week are: Wabash, 1,550 tons, including one item of 600 cast iron car wheels; Mobile & Ohio, 750 tons, and Kansas City Southern, 450 tons.

(For complete prices see page 754.)

Scrap Iron Too Low

Cincinnati, Oct. 9.—Although the iron and steel scrap market continues active, the large surplus of materials available is holding prices at a lower level than they would be normally. For instance, cast borings are selling today from $4.50 to $5, per net ton, but they would be normally bringing at least $2 or $3 per ton more. Dealers state, however, that they cannot secure more for them. One reason given is that makers of shrapnel shells have so much waste material left that they not only have enough scrap iron for their own use, but they can put some upon the market.

Active in South

Birmingham, Ala., Oct. 9.—Old material has been quite active and sales of cast scrap relatively heavy. Steel scrap of all kind continues scarce. Prices have been advanced on certain materials. Owners of a relegated furnace stack in the district sold a large quantity of bronze tuyeres, cooling blocks, monkeys and tuyeres the past week at fancy prices. The demand for all classes of scrap has materially increased, and dealers in general predict a further advance in prices.

Corporation Suit

Will Probably Be Advanced—All Lawyers Concur.

Washington, Oct. 10.—Argument of the government suit against the United States Steel Corporation probably will be made before the Supreme Court on Feb. 26. Solicitor General Davis of the department of justice submitted before the court this morning, when it convened, a motion to advance the argument, suggesting that the case be set down for hearing in February. The court will recess from Feb. 6 to Feb. 26, and the latter date, it is believed, will be selected as the time for taking up the Corporation suit. The counsel for the Corporation, according to Mr. Davis, has concurred in his motion to advance the date of argument. The solicitor general said to the court that "early determination of the case is of the highest public importance." It was contended that unless advanced it might not be reached on the court's docket before next fall. The court will pass on the motion to advance argument next Monday.

The government is appealing from dismissal of its dissolution suit in the lower federal courts, filed in 1911, in New Jersey.

High Billet Prices

Do Not Deter Buyers—All Semi-Finished Material Scarce.

Philadelphia, Oct. 9.—Semi-finished material remains a scarce article in this territory, as many buyers both domestic and foreign are having reason to learn. The active inquiry from these sources keeps up steadily, however, notwithstanding the fact that it is only the exception where sales are made. Eastern mills weekly are turning down large offers of business, especially for export. A tonnage for Montreal and a lot of 3,500 tons for England received such treatment this week. The leading eastern Pennsylvania seller of billets is practically sold up for the first half. Buyers show no hesitancy in offering to pay current prices for deliveries far into next year. A sale of open hearth billets for comparatively nearby was made at $55, eastern mill, and forging billets are bringing $70, mill, with as high as $75 asked. One maker has fixed $50, mill, as the minimum for open hearth billets. A rolling mill in this district is inquiring for 1,000 tons of the first crops from shell blooms for reinforcing bar manufacturers and has been quoted $40, mill. The American-British Mfg. Co. is low bidder at 2.25c per pound on 95,000 3-inch shell forgings for the Frankfort arsenal. It offered 10 weeks' delivery to begin in five months.

Sounding the Market

Youngstown, O., Oct. 10.—Consumers of shell steel who are not fully covered on their requirements until July 1 have been sounding out local producers during the past few days. Little tonnage is available from local mills, while in the country at large it is not believed that there is much more than 100,000 tons unsold, all of it for second quarter delivery. This tonnage will doubtless be distributed among regular customers, and mills which are only partially covered on steel for their shell contracts may have difficulty in securing sufficient steel unless they come under this heading. Shell steel discards are again in demand, but steel mills are converting more of these discards into finished rounds. The domestic semi-finished market is quiet, although some sheet producers have endeavored to line up sheet bars for the first quarter. One sale of first quarter sheet bars was made this week at $45.

Scarce at Pittsburgh

Pittsburgh, Oct. 10.—Scarcely any tonnage of semi-finished steel is available for shipment this year. Billets and sheet bars are being held at a range from $45 to $50, mill, although it is not believed that the latter figure could be shaded for nearby delivery. Specifications against contracts are very heavy and some new domestic demand is reported. Most domestic consumers, however, covered estimated requirements for the last three months of this year some time ago. Wire rods are being held at a range from $55 to $60, Pittsburgh. Muck bar is being quoted at $45, Pittsburgh, or $5 a ton above the previously prevailing minimum price.

Cast Iron Pipe

Bids Submitted on Large Tonnage for Detroit

Chicago, Oct. 10.—The feature of the cast iron pipe market at present is negotiation by the city of Detroit for 30,000 tons of 36-inch, 42-inch and 48-inch pipe. This matter is not definitely determined on, but figures were taken Oct. 10 on this tonnage and the city will determine later whether it desires to buy this quantity under present priced conditions. Bids will be opened at Kansas City, Mo., Oct. 13, on 600 tons of 48-inch pipe, at Webster Grove, Mo., Oct. 12, on 300 tons and West St. Paul, Minn., took figures Oct. 10 on 575 tons.

Detroit's Inquiry

New York, Oct. 10.—Bids have gone in on the unusually large requirement of the city of Detroit, calling for 30,000 tons of 36, 42 and 48-inch pipe. It is believed that the United States Cast Iron Pipe & Foundry Co. will receive all or a liberal portion of this business. The American Cast Iron Pipe & Foundry Co. has been awarded 500 tons of 10's for the Panama Canal. A contractors' letting for New York City, calling for 1,000 tons of 6 and 8's, is pending. The sewer department of Boston soon will take bids on 1,500 tons of 60-inch. Miscellaneous new business has shown some increase and there also has been more private buying in the larger sizes. The market is not active, however.

Plant Damaged

Birmingham, Ala., Oct. 9.—Producers do not report any exceptionally large tonnage booked, or in prospect, but sufficient business is in hand to warrant regular operations. Improvements are being made at the plant of the Lynchburg Foundry Co., Anniston, Ala., preparatory to putting into operation its high pressure pipe plant, which has been idle for the past year. The United States Cast Iron Pipe & Foundry Co., Bessemer, Ala., suffered a heavy loss at its plant by fire during the week. Operations will be temporarily suspended, but only for a comparatively short time.

(*For complete prices see page* 754.)

New Director

Of American Iron and Steel Institute —Members Elected.

Thomas Cantley, president of the Nova Scotia Steel & Coal Co., has been made a director of the American Iron and Steel Institute to succeed the late Thomas J. Drummond, president of the Dominion Iron & Steel Co. By this action, which was taken at the monthly meeting of the directors of the institute at New York, Oct. 6, Canada retains a representation of two members upon the board. The directors approved the program and made other final arrangements for the coming St. Louis meeting. Twenty-one names were added to the list of members-elect which will be transferred to the regular classifications as vacancies occur.

George E. Dix, Philadelphia, sales department, Midvale Steel Co.

John M. Garvin, Rock Run, Ala., manager and treasurer, Bass Foundry & Machine Co.

Earl H. Collester, Steubenville, O., superintendent, coke plant, La Belle Iron Works.

Laurence D. Weaning, Cleveland, vice president and general manager, the Variety Iron & Steel Works Co.

James C. Jones, Cleveland, president and manager, the Cleveland Steel Co.

Adam R. Demory, Detroit, vice president and general manager, Timken Detroit Axle Co.

Henry G. Barnhurst, Allentown, Pa., chief engineer, Fuller Engineering Co.

John H. Schuler, Allentown, Pa., metallurgical engineer, Fuller Engineering Co.

John G. Rummel, Detroit, president of Detroit Steel Products Co.

Edward F. Goltra, St. Louis, president, Mississippi Valley Iron Co.

Issac B. Morriam Jr., Chattanooga, Tenn., president and treasurer, Chattanooga Boiler & Tank Co.

George A. Sagendorph, Boston, treasurer, Penn Metal Co.

E. Arthur Tutein, Boston, New England sales agent, Thomas Iron Co.

George I. Stanford, Milford, Conn., president and general manager, Stanford Steel Products Co.

Daniel F. Eschenbrenner, St. Louis, general sales agent, Laclede Steel Co.

Harry J. Steinbreder, St. Louis, vice president, Laclede Steel Co.

William H. Sommer, Peoria, Ill., vice president and general superintendent, Keystone Steel & Wire Co.

Harry G. Moore, Peoria, Ill., general sales manager, Keystone Steel & Wire Co.

Charles R. Hook, Middletown, O., vice president, the American Rolling Mill Co.

L. L. Helmer, Cumberland, Md., general manager, Cumberland Works, N. & G. Taylor Co.

Albert T. Keller, Sparrows Point, Md., chief engineer, Maryland plant, Bethlehem Steel Co.

Talk on Politics—Senator Robert W. Washburn, of Worcester, addressed the New England Foundrymen's Association at its October meeting held at the Exchange Club, Boston, Wednesday evening, Oct. 11. His subject was "Politics". The usual dinner was served in connection with the meeting.

Rails for 1918 Delivery

Leading Producer Opens Books for Year After Next—Buying of Cars Very Active in the West

New York, Oct. 10.—Car buying became conspicuously heavy during the past week and 6,000 or more cars were placed under contract with the builders. More than 5,000 cars are represented by new inquiries of the week. The market, apparently, is swinging into a stride where heavy buying may be expected to continue for sometime since railroads on all sides are putting out inquiries.

The Louisville & Nashville bought 1,000 gondolas, 500 hoppers and 750 underframes of the Pressed Steel Car Co. and still is figuring on 600 hoppers and 750 underframes; the Chesapeake & Ohio closed for 1,000 additional hoppers with the Standard Steel Car Co.; the Wheeling & Lake Erie awarded 500 hoppers to the Pressed Steel Car Co. and 500 gondolas to the Standard Steel Car Co.; the Western Maryland placed 2,000 gondolas with the Pullman Co. Other new orders include 150 ore for the Utah Copper Co. and 70 passenger equipment for the Long Island both to the Pressed Steel Car Co.; 300 center construction for Armour & Co. to the Bettendorf Axle Co.

The Chicago & North-Western has inquired for 3,200 cars, including 1,700 gondolas, 1,000 box and 500 ore; the Illinois Central for 600 general service and 400 ballast; the Milwaukee Coal & Gas Co. for 300 general service; the Ohio City Gas Co. for 200 tank; the Pennsylvania Tank Car Co. for 150 tank; the Carolina, Clinchfield & Ohio for 100 automobile; the New York Central for 75 and the Norfolk & Western for 50 passenger equipment. A Chinese inquiry calls for 70 gondolas and 10 passenger cars for the Kwantung Yueh Hun railway. The Missouri Pacific 1,500 cars still are pending.

Locomotive orders this week include 25 for the Chesapeake & Ohio, 10 for the Wheeling & Lake Erie and six for the Long Island all to the American Locomotive Co.

Rail buying for 1918 which has been begun by the closing of 50,000 tons by western lines with the Steel Corporation, has not been extended very far as yet. Independent mills have not opened their books. There are several roads now considering purchases. The question of price for 1918 still is obscured but it is reported that quotations on the rails already closed are to be fixed later.

The railroad spike market is more active. The Baltimore & Ohio has asked for 15,000 to 20,000 kegs for new rails and also 15,000 kegs for maintenance for first half; the Seaboard Air Line wants 5,000 to 8,000 kegs; the Virginia also is inquiring. Spikes still can be had at 2.75c, Pittsburgh.

Book Rails for 1918

Chicago, Oct. 10.—The decision of the leading producer of steel rails to accept contracts on 1918 delivery, which resulted in preliminary tonnages being placed on the books during the past few days, has opened the way for contracting for that delivery.

This is said to set a new record for buying steel rails, as the time of delivery is almost 18 months hence. It is believed that leading railroads will proceed to place contracts for their 1918 requirements within a short time in order to avoid delay in delivery during that year.

Placing rail orders at this time will carry with it a demand for track fastenings for the same delivery and give mills a large tonnage of that material to figure on.

Roads Buy Many Cars

Chicago, Oct. 10.—Buying of railroad cars continues active and sales last week in the west exceeded any similar period for a long time. The Western Maryland railroad has placed 2,000 box cars with the Pullman Co., the New York Central has placed 2,000 gondolas and 1,000 box cars with the American Car & Foundry Co., and 4,750 cars with the Standard Steel Car Co., of which 3,000 will be built at the western plant and the remainder in the east.

The Chesapeake & Ohio railroad is inquiring for 1,000 hoppers, the Chicago & North-Western railroad for 500 ore cars, which is believed to be the forerunner of a purchase of 2,500 to 3,000. The Pere Marquette railroad is inquiring for 1,000 box cars and the Illinois Central for 400 ballast cars and 600 composite cars.

Nickel Plate Rails

Cleveland, Oct. 11.—The Nickel Plate railroad has placed an order for 5,000 tons of steel rails with the Lackawanna Steel Co., delivery to be next year. The rails will be either 80 or 90 pounds.

Acme's New Plant

The National Acme Mfg. Co., Cleveland, recently purchased a 15-acre tract in the eastern section of the city for the purpose of building a new factory. The plot of land is located on East 131st street, near the main line of the New York Central R. R. Sidings connected with both the main New York Central railroad and the Belt Line have already been laid.

The main building, which will be a one-story structure, will cover about eight and one-half acres. The plans will be completed and the contract let within a short time. The National Acme company expects to occupy the new plant in the early part of 1917. The entire product department will be moved to the new location. The plans were drawn up by Geo. S. Rider & Co., consulting engineers, Cleveland.

American Rolling Mill Additions

The American Rolling Mill Co., Middletown, O., is at present building two 75-ton open-hearth furnaces, which will be completed early next spring. The power plant is being enlarged to take care of the extra capacity. One additional building will be erected on each side of the present open-hearth plant to take care of the two new furnaces. The company is also planning to build two additional open-hearth furnaces in the near future, and is at present doing the preliminary work. It is not expected that actual work will be begun until next spring.

Carnegie Steel Co. Extensions

New York, Oct. 10.—At a meeting of the finance committee of the Steel Corporation this afternoon, an appropriation of $1,200,000 was passed for the reconstruction of the billet and bar mills at the plant of the Carnegie Steel Co., at Farrell, Pa. Newspaper reports previously circulated to the effect that this improvement had been authorized, were premature. The present billet and bar mills at the Farrell plant were installed some years ago and the improvement now ordered is to modernize these and to increase their capacity.

Coke Very High

Pittsburgh, Pa., Oct. 11. (By wire.)—Spot furnace coke today is selling at $4.35, ovens, and the market is quoted at a range of $4.25 to $4.35. Some dealers are asking $6 for foundry coke, but the market is quiet. No additional contracts have been placed for delivery next year.

(For complete prices see page 754.)

Supply of Ferro

May Be Curtailed by Submarine Warfare—Lively Interest

New York, Oct. 10.—Keen interest is being manifested in the trade as to the probable effect upon imports of ferro-manganese from England and of manganese ore from India in the event of the continuing menace to allied shipping of German submarines off the Atlantic coast. The possibilities of a sharp market effect, should these imports be interfered with seriously, are manifest. Some shipments of ferro-manganese and ore now are afloat or, in the case of the former, about to leave English ports. Usually consumers have sufficient stocks, so that any temporary interference with new arrivals probably would not be important. Any delays in English shipments greatly would strengthen the market position of domestic producers and some of the latter now are selling more cautiously. Prior to the submarine disturbance, some of the domestic producers, because of recent liberal bookings, were inclined to advance prices and one of them had begun to hold for $166, delivered, against the former quotation of $165, delivered. The reports have persisted, however, that quotations of $160, delivered, still are outstanding. Some consumers claim to have been named this price within the week. Several hundred tons of resale metal went at $162, delivered in the east. Fair-sized sales of domestic electrolytic ferro-manganese are reported at $162.50, delivered. Some 73 per cent Indian ferro-manganese is being offered in the market at about the normal differential under the 80 per cent price, or at $2 per unit. Considerable new inquiry is pending, totaling 2,000 tons or more. An eastern Pennsylvania consumer has closed against an inquiry for 600 tons.

Spiegeleisen is not so firm and now is quoted at from $40 to $45, furnaces, for 20 per cent. Selling has been heavier. One domestic buyer took about 1,000 tons and there have been other sales for as much more.

An advance of $10 to $15 per ton to a basis of $100, Pittsburgh, for carloads, has been put into effect by makers of 50 per cent ferro-silicon. It is probable that the usual concessions will be made to buyers of larger amounts. A scale of $2 per unit, as against $1.70 previously, has been adopted.

Fairly Active at Pittsburgh

Pittsburgh, Oct. 10.—The general market for ferro-alloys is active. Several of the more prominent sellers of lower grades of ferro-silicon have withdrawn from the market, after having sold the greater part of their output for the first and second quarters of 1917. Prices of this material likely will be advanced $1 or $2 a ton at an early date. Eighty per cent ferro-manganese continues to be quoted at $164, seaboard. It is almost too early to say what effect the activity of the kaiser's undersea craft will have upon the market for ferro-manganese, tin and the like, but it generally is believed that prices will advance sharply, unless the channels of commerce can be kept clear.

Indian Ore Sales

Philadelphia, Oct. 10.—Some further part cargo lots of Indian manganese ore have been sold to domestic buyers at approximately 65 cents per unit at tidewater. This ore is for shipment this year.

Pig Iron Exports

Make a New Record—Large Tonnage For Eight Months.

Pig iron exports for August, as reported by the bureau of foreign and domestic commerce, were the largest recorded in many years, the tonnage being 60,264, as compared with 28,718 in July, 1916, and 18,667 in August, 1915. The total exports of iron and steel products reported on a tonnage basis were 597,739, a gain of 93,000 tons over July. For the eight months ending with August, the handsome total tonnage is 3,721,257, compared with 2,083,933 tons for the eight months ending August, 1915. Exports of billets continue to increase, the tonnage for August, 1916, being 160,921, compared with 135,827 in July, 1916, and 89,134 in August, 1915.

The tonnage of imports was greater than for any month since December, 1915, the total being 32,257, compared with 14,729 in July, 1916, and 27,555 in August, 1915. The value of exports of iron and steel and manufactures thereof in August, 1916, amounted to $86,296,703, compared with $70,345,162 in July, 1916, and $37,726,657 in August, 1915, while the imports for the three months were valued at $2,888,390, $1,726,372 and $1,719,777, respectively.

Imports of manganese ore were slightly below those for the preceding month, the amounts being 76,721 tons for August, 1916, 81,942 tons for July, 1916, and 57,867 tons for August, 1915. Imports of ferro-manganese amounted to 8,525 tons in August, 1916, compared with 5,341 tons the preceding month.

Additional figures now available show that July machinery exports were valued at $18,971,052, while for the preceding month the value was $20,541,139, and for July, 1915, $11,410,116. Exports of zinc, except ore and dross, in July, 1916, were valued at $4,877,651, compared with $5,161,552 in June, 1916, and $2,584,320 in July, 1915.

EXPORTS OF MACHINERY.

1915.	Motor trucks.	Agricultural implements.	Aeroplanes.	Metal working machy.
June	$8,578,802	$854,670	$283,212	$3,735,562
July	6,803,001	963,534	880,836	3,872,358
Aug.	4,387,193	1,454,606	588,600	3,624,411
Sept.	5,882,255	1,092,797	101,950	3,256,973
Oct.	4,307,190	791,230	366,892	3,236,079
Nov.	3,837,307	1,054,235	13,770	4,644,713
Dec.	3,920,533	1,338,629	156,347	3,205,788
1916.				
Jan.	3,416,618	1,139,874	.....	3,249,595
Feb.	6,170,367	1,323,578	22,320	4,662,905
Mar.	4,909,179	2,287,605	8,400	6,501,022
Apr.	5,259,480	2,066,512	.....	6,552,397
May	4,357,238	2,277,966	.....	9,935,806
June	3,551,148	1,793,355	20,000	8,465,985
July	3,062,670	2,016,091	10,000	7,814,691

IMPORTS AND EXPORTS.

1915.	Imports, gross tons.	Exports, gross tons.
July	20,858	378,890
August	27,556	405,850
September	23,345	381,914
October	34,730	351,039
November	37,131	362,764
December	35,456	353,836
1916.		
January	15,824	354,416
February	20,279	368,869
March	26,212	438,054
April	20,176	384,917
May	32,114	540,580
June	26,786	526,759
July	14,729	503,187
August	32,257	597,739

IRON AND STEEL IMPORTS, GROSS TONS.

	August, 1916.	August, 1915.	Eight months ending August, 1916.	Eight months ending August, 1915.
Scrap	7,143	3,795	41,432	20,689
Pig iron	14,886	10,905	82,065	55,476
Ingots, blooms & billets of steel.	1,515	869	18,553	8,417
Wire rods	423	284	2,989	3,257
Rails	7,056	10,801	23,576	54,373
Bar iron	952	560	5,792	5,782
Structural	55	126	1,067	1,154
Sheets & plates.	122	165	1,216	857
Tin and terne plate	105	50	776	2,190
Total	32,257	27,555	177,466	152,195

IRON AND STEEL EXPORTS, GROSS TONS.

	August, 1916.	August, 1915.	Eight months ending August, 1916.	Eight months ending August, 1915.
Scrap	18,149	8,818	121,833	30,093
Pig iron	60,264	18,667	238,382	127,717
Billets, ingots and blooms of steel	160,921	89,134	895,005	353,031
Wire rods	11,450	12,554	107,626	103,637
Steel rails	41,820	57,040	304,773	184,136
Steel bars	79,336	42,326	525,031	258,695
Iron bars	5,207	4,005	52,245	20,040
Struc. iron & steel	27,581	22,843	182,533	138,370
Hoops, band and scroll.	3,649	3,675	29,589	15,901
Sh'ts & plates	47,822	47,128	326,325	272,395
Tin & terne plate	18,757	21,939	160,354	82,842
Barbed wire.	46,842	20,597	299,508	140,056
A'l oth. wire	26,067	24,612	188,200	146,404
Cut nails	278	220	2,795	2,487
Wire nails	14,809	11,271	99,339	57,011
All oth. nails incl. tacks	1,160	754	6,078	5,231
Pipes & fit'gs	28,801	13,758	135,885	114,122
R. R. spikes	1,367	596	18,561	4,217
Bolts, nuts, rivets and washers	2,653	2,767	19,357	12,982
Horseshoes	372	3,108	6,205	13,300
Cast radiat'rs	434	137	1,633	1,326
Total	597,739	405,949	3,721,257	2,083,993

(For complete prices see page 754.)

MEN OF THE IRON TRADE

Who they are **Where they are** **What they are doing**

W. P. BARBA, vice president of the Midvale Steel Co., Philadelphia, has severed a many years' connection with that company during which he has occupied many positions of responsibility. He plans to spend some time in travel and later will engage in special work for which his long experience has fitted him, such as the manufacture of ordnance, guns, armor plate and high grade shell products. Mr. Barba began his employment with the Midvale Steel Co. as a youth in 1880. By successive advancements he became chief chemist, department superintendent, general manager of sales, general superintendent and general manager. When the Midvale Steel Co. recently was acquired by W. E. Corey and associates, as a subsidiary of the Midvale Steel & Ordnance Co., Mr. Barba was made a vice president of the Midvale Steel Co. It is announced that E. E. Slick, vice president of the Cambria Steel Co., has been appointed to take over the duties hitherto looked after by Mr. Barba. Mr. Slick will have complete charge of the operations of all the companies composing the Midvale Steel & Ordnance Co., including the Midvale Steel Co., Cambria Steel Co., Worth Bros Co. and the Wilmington Steel Co. His headquarters will be with the general offices of these companies in the Widener building, Philadelphia.

W. G. Wagstaff, salesman of the Bethlehem Steel Co., in the Toledo territory, has resigned to accept a position with the Osborne Mfg. Co., Cleveland.

M. B. Giberson has been appointed Michigan representative of the Blackwood Steel Foundry Co., Springfield, O. Mr. Giberson has his office at 1325 Dime Bank building, Detroit.

E. J. Snell, master mechanic of the New York Central railroad, Corning, N. Y., has been appointed master mechanic, with offices at Watertown, N. Y. W. D. Chaffee has been transferred as master mechanic to Corning to replace Mr. Snell.

Robert R. McKechnie, who for many years has been mechanical engineer and assistant to the general manager of the Variety Iron & Steel Works Co., Cleveland, has resigned.

C. H. Williams, sales manager of the Nafra Co., Inc., 120 Broadway, New York, has sailed for Italy on business matters connected with the exportation of pig iron, in which that firm actively has been engaged.

J. N. Clarke, sales agent of the Bethlehem Steel Co., Cleveland, has resigned and will take up work in the field for the company. He has been succeeded by Stanley Smith, former sales agent of the Pennsylvania Steel Co., at Chicago.

R. A. Bull, manager of production in charge of operations of the Commonwealth Steel Co., at Granite City, Ill., has resigned, effective Nov. 1. Mr. Bull was president of the American Foundrymen's Association from 1914 to 1916.

R. A. BULL

Arthur T. Morey has been appointed general manager of the Commonwealth Steel Co., St. Louis, with plant at Granite City, Ill., succeeding William E. Hoblitzelle, who has resigned on account of long continued ill health.

Leo C. Steinle, formerly connected with the Steinle Turret Lathe Co., Madison, Wis., has taken the agency for the sale in France and Belgium of grinding machines built by the Modern Tool Co., Erie, Pa. Mr. Steinle's headquarters will be in Paris, France.

C. F. Messinger has been appointed manager of the concrete mixer department of the Chain Belt Co., Milwaukee. Mr. Messinger has for years managed the advertising department and is thoroughly acquainted with the mixer business. He is a graduate of the Sheffield Scientific school of Yale university.

U. Hashimoto, representative of Asano & Co., which are operating extensive ship yards near Tokio, Japan, is temporarily located in the east, where he is giving his attention to the purchase of large tonnages of ship steel. Asano & Co. recently have been large buyers of this class of material in this country.

George A. Kyle has been selected by the American International Corporation as the engineer in charge of the location and construction of railways to be built in China under the recent contract taken by that corporation and other American capitalists. Mr. Kyle recently has been in charge of location and construction for the Northern Pacific railroad. He has had an extensive experience in railroad construction in various foreign countries, especially in South Africa and Alaska.

Wm. W. Weller has become associated with the Vulcan Steel Products Co., 120 Broadway, New York, and now is acting as its representative in France. Mr. Weller has had an experience of 15 years in the steel industry and served for several years of that time as sales manager for a large pipe manufacturer. Others who have become affiliated with the Vulcan company include Geo. W. Blen, now on a business mission to England, who previously had served in the operating department of the Carnegie Steel Co., and other companies; Warren M. Maule, formerly assistant in the comptroller's office of the Cambria Steel Co., who has been made secretary and head of the accounting department; Fred M. Cole, formerly of the manufacturing department of the Cambria Steel Co., who has been placed in charge of the purchasing department; F. G. Belsito, who has had sales experience in various countries, as foreign representative and H. D. Mills, formerly head of the foreign shipping division of the American Express Co. and previous to that time with the various railroads, who has been placed at the head of the traffic department.

New Malleable Plant

Toledo, O., Oct. 8.—The Houghton Malleable Castings Co., which is installing machinery in the old Wilkes foundry buildings, at Woodville street and the Wheeling Belt railroad, will make the third malleable castings plant to be established in East Toledo. I. L. Houghton, formerly with the National Malleable Castings Co., and the United States Malleable Castings Co., in Toledo, and has had experience in Detroit in the same lines, is head of the new industry. It is announced that the plant will be in operation within the next 30 days. The company has secured seven and a half acres in connection with the buildings and has a frontage of 1,200 feet on the Wheeling Belt railroad. The latest designs in furnaces are being installed.

Tool Builders' Meeting

The National Machine Tool Builders' Association will hold its fifteenth annual convention at Hotel Astor, New York City, Oct. 24 and 25. The program for the two-day session is devoted almost entirely to committee meetings. The first meeting, Oct. 24, will be devoted to business as will the closing meeting, Oct. 25, at which time, James A. Emery, counsel for the National Council for Industrial Defense, will address the members of the association.

New Steel Security

New York, Oct. 10.—Trading in a new steel security, the United Alloy Steel Corporation, has been inaugurated in the New York market. The stock is being sold, "when issued". An announcement regarding the plans and character of the new corporation is expected shortly.

Prices Higher

Cleveland, Oct. 11.—A Cleveland company, which has been quoting 3.25c on plates, has advanced to 3.50c, and the market is very strong. On No. 10 black sheets, 3.25c is being quoted by the same company.

Wheel Company's Plans

The Ackerman Wheel Co., which was recently incorporated in Ohio for $2,000,000 to manufacture steel vehicle wheels, has secured a short term lease on a manufacturing plant in Cleveland which it will use for several months. The company plans to spend $250,000 in the spring to erect a new plant, the design of which will be determined largely by the operation of the temporary plant. The main offices of the concern are in the Rockefeller building. A. H. Ackerman, Chicago, is president of the company, and M. MacEverhead, Massillon, O., is vice president.

Mr. Neeland Resigns

New York, Oct. 11. (By wire.)—M. A. Neeland, assistant to the vice president and chief engineer of the United States Steel Corporation, has resigned to become consulting engineer of the American International Corporation. Mr. Neeland has been connected with the Corporation and companies from which it was formed for about 25 years, starting as chief engineer at Duquesne, of the Carnegie Steel Co. John Hulst, former chief engineer of the Carnegie Steel Co., has succeeded to Mr. Neeland's former office with the Steel Corporation. Both changes are now in effect.

Quebec Bridge Contract

Pittsburgh, Pa., Oct. 11. (By wire.) It is announced that the Carnegie Steel Co. received a contract for 5,000 tons of structural material for a center span of the Quebec bridge, to take the place of the span that was accidentally lost Sept. 11 during erection. The material will be fabricated and erected by the St. Lawrence Bridge Co. The American Bridge Co. will furnish 800 tons of I-bars which will be made at its Ambridge plant, Ambridge, Pa.

The Non-Ferrous Metals

Copper Lead Spelter Tin

The sinking of several ships off Nantucket by a German submarine is causing much speculation as to the effect upon the metal markets. An easier tone was apparent in the markets this week. Unless the submarine campaign should prove at variance with international law as interpreted by the United States, the only effect now feared is a temporary interruption to shipping out of New York harbor.

Large sellers are maintaining a firm position, but, as is generally the case, smaller interests are manifesting a disposition to sell at concessions.

Great strength characterized practically all metals last week. The spurt in spelter was easily the outstanding feature. An improved demand for prime western was in evidence around the middle of the week, and on Thursday inquiries from virtually all sources came into the market in enormous volume. Prices went up by leaps and bounds and one large producer was placed in a position where he would not even consider orders for this year's delivery at 10c, St. Louis. Buying on Friday and Saturday, however, was somewhat lighter, as buyers were hesitant about paying the prevailing higher prices. Reports were current the last couple of days that the allies had placed a large tonnage with producers in this country, but these could not be verified and are considered untrue. It is understood, nevertheless, that considerable business was placed for foreign account. Prices have eased off this week, however.

Copper Was Firm.

The copper market was very firm, and toward the end of the week prices tended higher as the result of an improved demand from domestic consumers coupled with the great scarcity of metal for all positions. A good sized volume of business continued to be booked from private foreign consumers and it is expected that Italy, the only foreign government in the market at this time, will place a large order shortly. Supplies of casting and lake copper remain scarce and sellers are very firm as to their views on prices.

Tin Went Higher.

Advances were witnessed in tin and a good amount of business was booked for domestic account for all positions. The market is in an exceedingly strong position and some interests are predicting 50-cent tin before the end of the month. Tin plate makers are expected to fix their 1917 selling price shortly and then come into the market for the bulk of their requirements. The present level of Straits tin for nearby shipment is about 43c, New York, while futures are holding at approximately 42.50c, New York.

Buyers of lead remained comparatively inactive, only a few small orders being placed for domestic consumption. Supplies were scarce, with large producers out of the market on October metal and several sold up for the greater part of November. The strength of the market was maintained and prices in the outside market are nominally unchanged from last week. An advance in the asking price of the American Smelting & Refining Co., which continues to quote 7c, New York, is expected by many in the trade.

Antimony during the past few days appeared somewhat stronger. Demand, although still comparatively small, was in somewhat better volume from domestic buyers. Foreign consumers also displayed a little more interest and it is understood Italy will close on a good tonnage shortly. More extensive buying by munition makers now is expected, as these interests have been relatively inactive for some time.

Aluminum Inquiry Heavy.

Inquiries for virgin ingot aluminum for prompt and nearby shipment continued heavy, although buying was retarded by the shortage of this material. As had been previously stated, this scarcity is due in part to the large export shipments which are being made by the Aluminum Co. of America.

(*For complete prices see page 754.*)

By-Products Insure Preparedness

Nitrogen in Quantities to Meet Requirements of Any War Emergency Can Be Supplied by Rapidly Growing By-Product Coke Industry—Proposed Government Fixation Plant Will Be Unnecessary

BY HORACE C. PORTER

MY PURPOSE in presenting this paper on the subject of fixed nitrogen from coal carbonization is to call attention to the present remarkable growth of by-product coke making in this country, and to dispel if possible certain illusions relative to this industry. The supply of fixed nitrogen from coal now available as a by-product of coke and gas making is much larger than is generally realized and its importance has in some quarters been unduly depreciated.

The increase in capacity for ammonia production at by-product coke plants due to new establishments now building and those put into operation in 1916 amounts to 46,400 tons of ammonia, NH_3, per year. Taken together with the present producing capacity of gas works other than coke ovens, which is equivalent to 12,500 tons of ammonia per year, this increase in capacity more than meets the government's estimate of the requirement of the United States for fixed nitrogen for munitions of war. In other words the producing capacity of coke ovens as it stood in 1915, need not be touched for this emergency; the assured increase in 1916 and 1917 will in itself provide an adequate nitric acid supply for war needs.

From the curves in Fig. 1 may be seen the rapidity of the increase in the last few years. In the four years from 1914 to 1918, 56,000 tons will have been added to the producing capacity of coke ovens, an amount nearly equal to the entire previous growth of the industry during the 20 years of its history in this country.

The sustaining of life on the earth depends upon the absorbable nitrogen in plant foods; the destruction of life in war requires the use of fixed nitrogen in explosives. For plant life nitrogen in combined form is essential and must be artificially supplied in many localities; for all known military explosives, nitrogen in the form of nitrates or nitric acid, is absolutely indispensable. The nation, therefore, has become aroused naturally and rightly to an intense interest in the question of nitrogen supply. The great European war and a realization of America's lack of military preparedness are largely responsible for this interest at the present time.

In view of recent legislation by congress providing for investigation of this matter and eventually for the building of a government nitrate plant, it is well now to take account of stock and let the nation be

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A paper presented at the recent New York meeting of the American Chemical Society. The author, H. C. Porter, is associated with the H. Koppers Co., Pittsburgh.

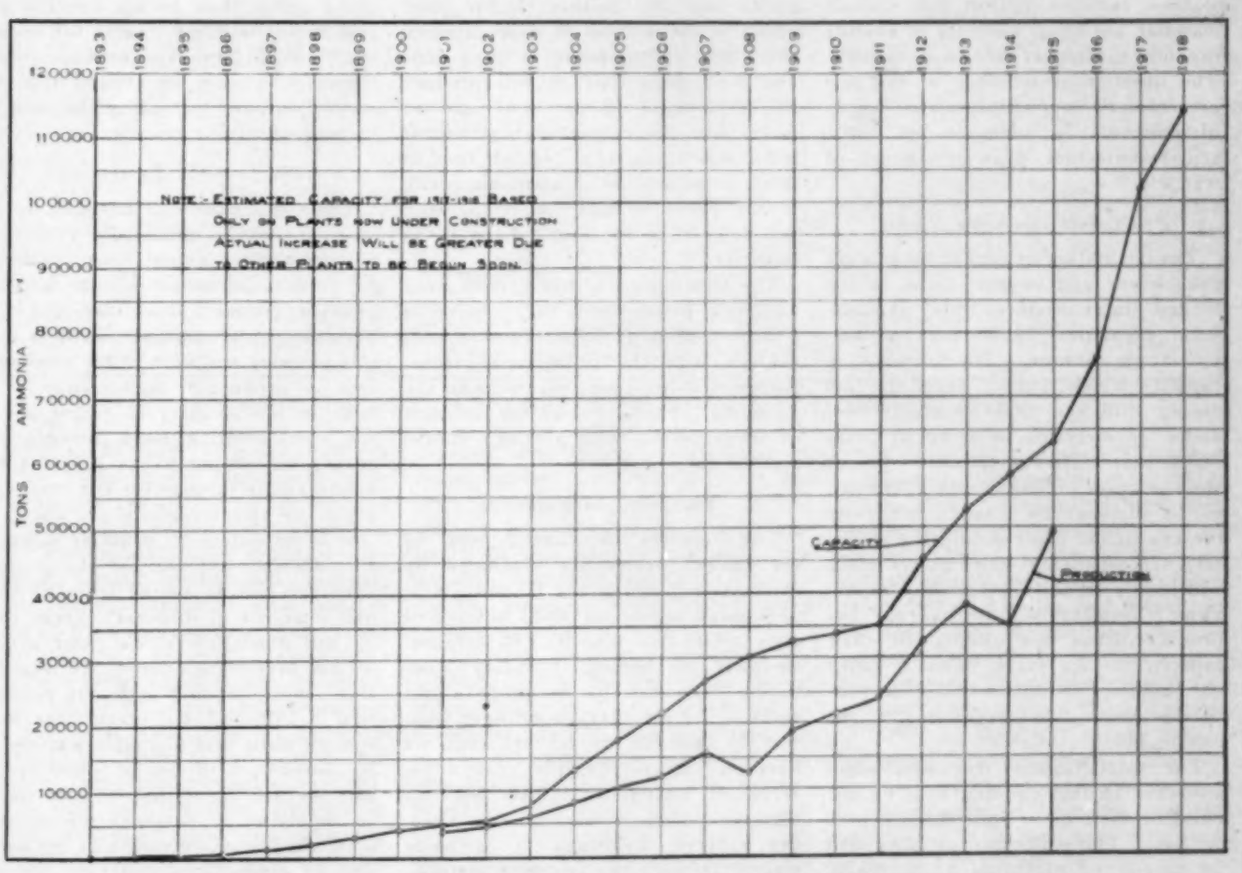


FIG. 1—CAPACITY FOR AND PRODUCTION OF AMMONIA AT BY-PRODUCT COKE PLANTS, 1893 TO 1918

informed as to its present resources in fixed nitrogen, particularly in those obtainable from coal. We have need of correct and authoritative information on this subject, for a great deal of misleading and unfortunate misinformation has been put before the public within recent months, much of it no doubt unintentional and due to ignorance.

Sources of Ammonia

Ammonia is the most available source of nitric acid when Chile saltpeter is not at hand. The contact process of oxidation of ammonia has been put on a practical manufacturing basis and on an immense scale in Germany. Experiments in our own country have gone far enough to prove it feasible for emergency use. Other sources of nitric acid are more costly and more cumbersome.

As to the source of the ammonia, it does not matter much from a technical point of view what source is used. In Europe, both the by-product ammonia from coal and the ammonia produced from cyanamide have been used. No doubt the synthetic ammonia of the Haber process is equally good. The ammonia, from whatever source, must be purified from sulphur and carbonic acid as in some of the contact processes, at least, these substances tend to poison the contact material, but small amounts of volatile organic substances are not harmful. The question is whether or not our present and our prospective supply of ammonia is adequate for nitric acid manufacture in an emergency of war.

By-Product Ammonia Supply

The distillation of coal in by-product coke ovens and in gas works in the United States produces today at maximum capacities, 88,500 tons of ammonia per annum. The increase in capacity which will be added to this during 1916 and 1917 by plants now under construction will be at least 38,000 tons. The government's recent appropriation of $20,000,000, if devoted to an atmospheric fixation plant by the cyanamide process, and the necessary accompanying water power plant will have a capacity in ammonia equivalent, considerably less than the by-product ovens are adding to their capacity in two years. This is based on published estimates made in connection with the hearings on the nitrate bill.

The total capacity for by-product ammonia in this country will, by the close of 1917, be at least 126,500 tons as NH_3. This combined capacity will be capable of producing about 404,000 tons of 95 per cent nitric acid. Inasmuch as ammonia liquor is a more ready form for conversion into nitric acid than is ammonium sulphate, it may be noted that the coke plants of the country are so equipped that between 35 per cent and 40 per cent of their total ammonia capacity can be produced as liquor. It is to be borne in mind also that all plants producing sulphate produce about 25 per cent of their total ammonia in the intermediate stage of weak liquor and could quickly and easily be modified so as to place their product on the market as strong ammonia liquor, in that proportion.

By-product coke ovens can now produce a total of 75,950 tons of ammonia. Within 18 months there will be about 38,000 tons added to this, or an increase of 50 per cent. The gas works of the country produce about 12,500 tons more, practically all in the form of liquor. The grand total of capacity at both gas works and coke ovens is 126,500 tons, of which somewhat over one-third is new, being added during the years 1916-1917.

Is Adequate for War Needs

If the United States consumption of ammonia for all purposes in 1915, amounting to 70,000 tons, is subtracted from this increased total capacity and the balance, 56,500 tons, which is the surplus of 1918 capacity over 1915 consumption, is then converted to nitric acid, it will produce 181,000 tons of 95 per cent acid or more than the estimated requirement for a war emergency. In addition to this a large amount of ammonia could, in the event of war, be temporarily diverted from its usual disposal as fertilizer.

The distribution of these coke oven ammonia plants over the country is a matter of large importance in connection with the problem of transportation to proposed plants using the ammonia. Fig. 2 shows the location of these plants, with a rough indication of their size.

The Nitrogen Reserves

The reserves of minable coal in the United States are estimated by M. R. Campbell, of the United States geological survey, at 3,540 billions of tons. Of this amount, by present methods of mining, probably 2,360 billion tons can be brought to the surface. If the average nitrogen content in this coal is 1.3 per cent we have in our recoverable coal a reserve of nearly 31 billion tons of nitrogen. Part of this immense nitrogen reserve, unfortunately, is being wasted through the common methods of utilizing coal by combustion, and, by non-recovery coking. We mined bituminous coal in 1915 containing 6,000,000 tons of nitrogen, and of this 1,000,000 tons could have been recovered if all the coal had been treated in modern coke ovens or by-product gas producers. We actually recovered in by-product ammonia in 1915 about 51,000 tons of nitrogen.

Little Nitrogen Reclaimed

About nine-tenths of 1 per cent, therefore, of the coal nitrogen which was mined in 1915 was utilized. In 1918 possibly double that amount will be saved. Five per cent of what was mined would easily take care of the country's demands for ammonia and nitrates for many years.

The coal actually made into coke and gas in 1915 would have yielded 135,000 tons of nitrogen in the form of by-product ammonia if it had all been coked with by-product recovery. This would have approximately equalled the amount of fixed nitrogen actually used in the United States in 1915 other than that in the organic ammoniates such as packing house wastes, and that in munitions sent abroad, that is, between 125,000 and 150,000 tons.

At the rate at which our coal is now being mined, the nitrogen reserves would be exhausted in 6,000 years. Less than 10 per cent of the coal mined is being treated for recovery of its nitrogen and we have room, therefore, greatly to expand this recovery without increasing the rate of exhaustion of our reserves.

Able to Meet Emergencies

The coal by-product nitrogen, to be sure, cannot be practically recovered to any greater extent than conforms to proper utilization of the accompanying products, coke, tar, gas and gas-power. But this utilization is rapidly growing and even at the minimum rate of production and utilization of coke in this country in recent years, the corresponding fixed nitrogen recovery, amounting to say 125,000 tons, would amply provide for the country's needs in an emergency of war.

It is important to consider whether a sufficient amount of by-product ammonia can be spared from its regular channels of disposal to take care of the needs of a war emergency. As has been shown above, the increase alone in by-product ammonia production in 1916-1917 will make more than enough nitric acid to supply war needs. If, however, it should be found necessary to use more than this in order to supply other demands for nitrates or nitric acid there would be no hardship or difficulty in diverting, for the temporary need, a large part of the

present production of ammonia from its normal uses.

Fertilizer, in America, is not indispensable for maintaining the home consumption of food crops. Of course, the use of fertilizer is by all means to be encouraged. If we will improve our crop yields per acre and raise our efficiency in agriculture to a par with that of most other countries we must among other things use more fertilizer. However, it can hardly be questioned that as a temporary expedient in an emergency of war, we could, without jeopardy to our food supply or the national welfare, divert 75 per cent of the 160,000 tons of ammonium sulphate now devoted annually to fertilizer purposes, and use it for nitric acid manufacture. Giving up also the 200,000 or 250,000 tons of nitrate used as fertilizer, we should still have available the abundant supply of organic ammoniates, tankage, bone, blood, cottonseed meal, etc., of which the consumption was about 2,000,000 tons in 1915.

The country's needs for refrigeration, which are stated authoritatively to be about 4,000 tons of ammonia annually or under 5 per cent of the present ammonia producing capacity, it is true, could not be diverted to other use, nor could the ammonia be diverted to ammonium nitrate for military explosives. These uses, however, are small as compared to that of ammonium sulphate as fertilizer, and would not need to be invaded in order to provide for nitric acid manufacture.

If 57,000 tons of ammonia should be used to meet the government's estimated need of 180,000 tons of nitric acid, and say 30,000 tons more of ammonia for other nitric acid, there would still remain, of our 127,000 tons of by-product ammonia, a balance of 40,000 tons to meet the requirements of industries. In 1915 about 26,000 tons were used for purposes other than as fertilizer.

The foregoing facts and figures presented in behalf of by-product ammonia are based only on the assured capacity of existing plants and of those under construction. It has been shown that the needs of the country in fixed nitrogen in an emergency of war can be met with this assured ammonia capacity. The industry, however, may look forward to a still larger growth.

The total coke consumed in the United States in 1915 was about three times what was produced in by-product ovens. The estimated capacity of by-product ovens for the year 1918, as given in the accompanying chart, based on plants now under construction, is probably less than 55 per cent of the total coke which will be made in that year. By-product coking, therefore, has room to grow; it can almost double the capacity shown by plants now built or building before it will meet the country's present requirement in coke.

The present coke requirements are destined also to grow. The growth of coke by-products recovery is not limited, as many have claimed, to the demands of the steel industry. The sale and use of domestic coke, that is, all coke used for fuel purposes other than metallurgical, is rapidly expanding in this country. An amount not far from 2,000,000 tons was sold in the United States in 1915 and records of recent years show an annual growth of sales of fuel coke in many communities of approximately 30 per cent.

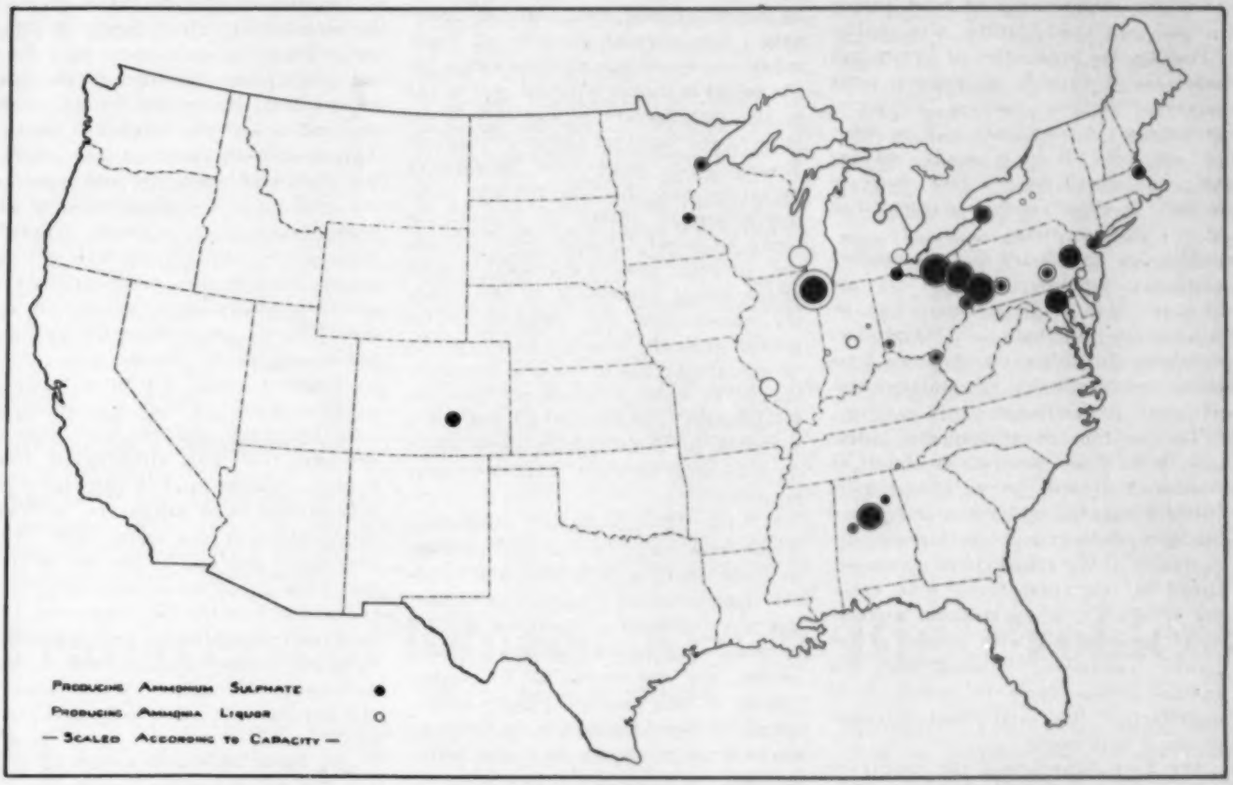


FIG. 2—DISTRIBUTION OF BY-PRODUCT COKE PLANTS IN THE UNITED STATES

By-product gas producers afford another source of ammonia from coal, supplementing the coke ovens and gas retorts. These producers offer immense possibilities for the future, since they can utilize non-coking and inferior coals, lignites, and the coal wastes obtained in mining and in coal washing. Their yield of ammonia per ton of coal is from 15 to 18 pounds as NH_3 and their gas can be utilized for power in gas engines. These producers have had a large development in recent years in Germany and England and it is claimed that very cheap power is being made by them.

Germany, when the war began, had to provide for immense new supplies

of fixed nitrogen. Chilean nitrate was cut off, by-product ammonia had reached almost its limit of production, and finally, to cope with the enemy blockade of food stuffs, the soil had to have nitrogenous fertilizer in undimished quantity. There was no recourse except atmospheric fixation. Germany met the situation and, by a remarkable development of fixation processes has in two years built up a nitrogen industry from about 22,000 tons a year to about 140,000 tons, not including by-product ammonia. All credit be given her for this achievement.

America, on the other hand, uses very little fertilizer for food crops and would be in no degree dependent on it for maintenance of food supply in war. In this country, also, unlike Germany, the production of by-product ammonia is capable of a very large increase without causing an overproduction of coke since half or more of our coke is now made without by-product recovery. This increase in fact, is rapidly being accomplished at the present time.

America can spare her by-product ammonia, temporarily, from its use as a fertilizer, while Germany cannot. Ammonium sulphate, or by-product ammonia furnishes in America less than one-fourth of the total nitrogen used in fertilizers.

The fixation of atmospheric nitrogen will come sooner or later in America. It will be welcomed as a valuable supplementary source of fixed nitrogen independent of foreign importation. We shall have it established in fair competition with existing industries, when, without government subsidy but with proper water power legislation, it shall find low enough power costs to enable it to manufacture and sell fixed nitrogen products at a profit.

We have shown that the supply of fixed nitrogen in this country from coal by-products is great enough to take care of estimated war needs and the latter, therefore, cannot be urged as an excuse for a government subsidy to the atmospheric nitrogen fixation industry.

The Government's Action

Now what has been done on this question by the last congress, and what is the possible effect of its action?

An appropriation of $20,000,000 was made to build a nitrate plant to be owned and operated by the government. The act making this provision is a military measure, Section 124 of H. R. 12766, "An Act to Increase the Efficiency of the Military Establishment of the United States." The plant may be operated in time of peace and sell its product. In other words, it is a government ownership project, which may result in government competition with private enterprise in time of peace. In the face of the fact that we have already an adequate supply of ammonia for war needs, congress has provided for an expensive establishment to insure such a supply, and opened the way for government operation of this establishment as a competitor for private trade.

Scarcity of Toluol

Here we must call attention to the fact that the by-product coking and gas industries afford our only source of benzol, toluol and coal tar products. The present capacity of these industries would not give the nation all the toluol it should have for war needs in the manufacture of explosives. In spite of the fact that Great Britain and France have large coal by-product industries and that the present large production of toluol in America is being in great measure sent abroad, the present abnormal market price which toluol commands in this country shows that the demand is far greater than the supply. So important to military preparedness is a maximum supply of coke by-products that the government should run no risk of a set back to this industry until all of the coke shall be made with by-product recovery.

If the governmental authorities which now have the nitrate problem in hand shall so interpret and apply this legislation of congress as to permit governmental competition in time of peace with present producers of ammonia, the expansion of by-product coking in this country will be endangered. When by-products do not command good prices the American manufacturer does not easily turn from the simple bee hive coking to the more elaborate by-product ovens. Conservation and industrial advancement in America are involved seriously in the decision to be made.

It is claimed for this bill that its virtue lies in benefiting the farmer by lowering the cost of his fertilizer. The producer's price of nitrogenous fertilizer in this country has not been greater than in other countries. This can be verified by published quotations. The farmer has to pay more for his fertilizer in the United States than he does in Belgium or in Germany because of higher transportation costs and other factors over which the producer has no control. It is now proposed, however, by advocates of governmental fertilizer manufacture, that the present producers of ammonia shall bear the burden of a reduction in cost to the farmer, place their prices below those of European countries, and thus allow the expansion of large and important industries, essential to the national welfare, to be retarded. Investigation is now being made by governmental boards, to determine, before the nitrate plant is built what shall be the process to be used therein. These investigating boards are fully informed as to the large and growing supply of by-product ammonia and are making their inquiries accordingly.

The ammonia carried in the gases from coke ovens or gas retorts is partly in combined form as chloride, sulphate, cyanide, etc., and partly free or loosely combined as carbonate, hydro-sulphide, etc. Since the raw gases always contain water as a product of the decomposition of the coal, an aqueous condensate forms in the gas mains and the large gas coolers. This condensate carries a large part of the combined ammonia and some of the free. It is a weak solution of ammonia varying in strength generally from 0.2 to 1 per cent NH_3. In all plants whether they make sulphate of ammonia by the direct process or ammonia liquor by washing the gas, this condensate in the mains and coolers is obtained, and constitutes from 20 to 30 per cent of the total ammonia.

In the direct process for ammonia recovery, the gas after being freed from tar passes directly into sulphuric acid in lead-lined saturators, arranged for continuous operation. The Koppers direct process, by use of reheaters for the gas, maintains temperatures in the gas and in the saturator such that an excellent quality of well crystalized sulphate forms and the bath is kept at constant strength. Condensation in the saturator is effectually prevented.

Types of Washers in Use

At plants where all the ammonia is made into liquor a gas washing system is used, whereby the gas is thoroughly washed with cold water in suitable scrubbing towers. These are either of the bell type consisting of a series of superimposed rings in each of which the gas passes from under a bell through circulating water or of the simpler grid type in which the water flows downward in the tower over grids which offer large surfaces to the gas for the absorption of its ammonia. The weak aqueous liquor thus produced is distilled and concentrated by steam in special column stills, continuously operated, and requiring very little operating labor. The so-called "lime leg" takes the residue from the free ammonia still, and distills it with

milk of lime in a special still. For making purified liquor or aqua ammonia these stills are elaborated by the addition of more rings and dephlegmating sections; hydrogen sulphide and carbonic acid are eliminated by utilizing the great difference of solubility between these gases and ammonia gas in water or weak ammonia solution. Pyridene and traces of organic matter or of tars are removed by oil or charcoal washers. In some plants the last traces of carbonic acid and sulphur are removed by lime washers.

Now, in case a question may be raised as to the suitability of by-product ammonia for use in a contact process of nitric acid manufacture, it may be said that many evidences are at hand to show that this ammonia has been used successfully abroad for such processes on a commercial scale, and preliminary experiments in this country on a small scale show that the process works well with by-product ammonia and gives a conversion of 90 per cent or higher.

An article by Schuphaus appearing on page 21, Volume 13 of *Metall und Erz* describes the practical operation of a plant making nitric acid by the Ostwald process and using crude ammonia liquor for the raw material. No difficulties likely to arise with this raw material are mentioned.

Hilgenstock, a high authority on ammonia and its production, published an article on the German *Journal fur Gasbeleuchtung*, Nov. 27, 1915, on the methods of concentrating and purifying ammonia liquor from gas and coke plants. He states, "On account of the large demands of the war operations for ammonia, this production of concentrated liquor and of pure aqua ammonia has lately come to the forefront again."

A prospectus issued in 1913 by the English Nitrogen Products & Carbide Co., Ltd., and abstracted in *Iron and Coal Trades Review*, page 837, Volume 86, states that in the contact process which will be used to make nitric acid from ammonia "it does not matter much from a technical point of view what source is used for the supply of ammonia". The ammonia plant * * * sends out nearly pure, dry, ammonia gas freed from CO_2 and H_2S. The gas is not freed from traces of organic materials which may come over with it for these impurities have been shown to exert no harmful influences on the process."

Further references of this kind showing the use of by-product ammonia in these processes might be cited. There appears to be nothing in the technical literature showing that such use has been found impracticable. The process has not been placed on a commercial footing in the United States and is in the experimental stage only in this country.

A recent bulletin issued under the direction of the United States geological survey describes the deposits of tin ore found in an unnamed range of hills in Lander county, Nevada. The discovery was in the form of a nugget of wood tin, which, when analyzed proved to be a very high grade of tin ore. The ore occurs in a belt about 10,000 feet long and 2,000 feet wide. The veins are generally enclosed in rhyolite and range in width from fraction of an inch to 18 inches. A nugget of the wood tin which was analyzed in the laboratory of the geological survey consisted of approximately 85 per cent stannous oxide, the greater part of the remainder being hematite. The survey estimates that ore carrying an excess of 1 per cent metallic tin can be worked profitably from the deposits in this region.

Standardization Rules

The American Institute of Electrical Engineers has issued the 1916 edition of its standardization rules relating to standards and units appertaining or applicable to the various phases of electrical engineering. These rules were framed primarily to define the terms and conditions which characterize the rating and behavior of electrical apparatus, with special reference to the conditions of acceptance tests. No attempt has been made to standardize the dimensions or details of construction of any apparatus lest the progress of design and construction be retarded. The 1916 revision of the rules does not differ radically from the preceding issue, although a number of changes and additions have been made. In a few cases deletions have been made. The rules cover the entire field of electrical engineering, giving definitions, outlining procedure in testing, and specifying the approved performance of electrical machinery and apparatus.

Transverse Fissures Are a Big Problem

BY A. W. HEINLE

MR. P. H. DUDLEY deserves thanks for disclosing to the rail manufacturer, through various publications, the result of his extended investigations of some of the causes of transverse fissures in rolled steel rail, published in *The Iron Trade Review*, Aug. 17. Dr. Dudley deserves their commendation because he is not a skilled worker in the art of conforming rolled shapes where mechanical roll effect must be carefully weighed against a possible creation of a heterogeneous core. Dr. Dudley advises reheating the bloom as a help and it is believed that this treatment is correct and partially effective. There is, however,, considerable doubt as to that factor regularly controlling the transformation activity of a heteregeneous condition of the metal through the head during completion of rolling, or that it absolutely eliminates the transmitted effect of the gag.

Several years ago the writer contributed an article entitled "The Shape of the American T-Rail Primarily Responsible," to an engineering journal. In that article certain suggestions with regard to rail rolling were made. The theory of minimizing irregular transformation of metal in the rail head was discussed. While certain physical fundamentals were implied, but not explained at length, they can be read into almost all recent developments in rail betterment. It is well known that during rolling, the heat works outward as the metal is progressively reduced, and when a metal reduction is equal to and accompanied by a corresponding equal drop in temperature, the workable state of the metal is naturally extended to a state where absolute control of the granular transformation is secured. No longitudinal tension occurs and a homogeneous structure is "trapped" before grain enlargement takes place. In this manner internal strain is avoided. A figure of symmetrical proportions will always admit of a regular progressive reduction at a satisfactory "natural" relation in temperature. It is for this reason an unbalanced figure must be finished hurriedly and before figurative distortion is excessive even at the expense of good structural attainment.

The standard type rail is a continual aggravator of discrepancies that mystify the investigator who attempts to eliminate the troubles without altering the general shape of the rail.

The accompanying paper is a discussion of an article which appeared in the Aug. 17 issue of *The Iron Trade Review*. A. W. Heinle is a metal rolling engineer, Pittsburgh.

Improved Machinery for Foundries

Standardization of Production and Increased Efficiency in Foundries Result from the Use of Modern Equipment—The Stripping Plate Machines Described in This Article Are Particularly Ingenious

AT THE plant of the S. Freeman & Sons Mfg. Co., Racine, Wis., molding machines of the stripping plate type have been highly developed and have been adapted to a wide range of intricate patterns. The machines were designed and their applications were worked out by J. W. Dearsley, superintendent of the Freeman foundry. They are all hand-operated, making them especially applicable for use in foundries not equipped with compressed air. About 30 styles of machines have been developed to cover a wide variety of requirements and many of these were designed to give greater efficiency in the Freeman foundry. The Dearsley machines soon attracted the attention of other foundrymen and the solution of their problems marked the entrance of the Freeman company in the molding machine business. The wide field of usefulness of these machines is indicated by the accompanying illustrations.

Fig. 1 shows a type of roll-over machine especially designed for the production of stove plate and will handle patterns as large as 30 x 42 inches. It has a drop of about 4 inches.

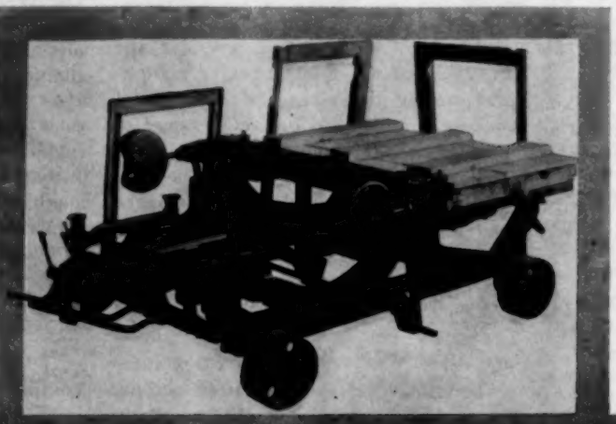
A standard stripping plate machine arranged for a double draw is illustrated in Fig. 2. The assortment of patterns in the foreground indicates the many changes possible. In the case of this machine all the pinions required by the purchaser were provided for on the one machine. It could accommodate many more changes were they desired. It is not necessarily a gear or pinion machine as any irregular pattern, such as small pulleys and other forms could be produced. The double top can be removed and a single top substituted as all parts are interchangeable.

A long draw stripping plate machine is shown in Fig. 3. This particular design is used in making molds for rollers with the shafts cast integral for ensilage cutters. It is equipped with four changes of patterns and five changes for each pattern, giving 20 sizes of rollers. More changes could have been provided had they been necessary. Special provision is made for long draws that will be free from defects.

A trio of pulley machines to produce sizes from 10 to 32 inches in diameter are illustrated in Fig. 4. They are arranged for any required range as to height of face, diameter of pulley, size of hub, core and other dimensions. Changes are made easily and in a few minutes.

A Dearsley stripping plate machine equipped for the production of a four-part mold is illustrated in Fig. 5 and a gate of four of these castings as shaken-out is illustrated in Fig. 6. As the machine is set in Fig. 5, a cheek is molded on each head, one being reversed over the other to produce a mold for the body of the hollow spool. The cope and drag contain the mold for the flange and hub projections and are made on the two upright plates, which are dropped to a horizontal position after the patterns have been stripped and cheeks removed. Fig. 8 shows a machine on which a pattern is mounted which it would seem impossible to strip. The two projections on the front of the pattern are arranged to be stripped horizontally until they rest entirely within the perpendicular portion, which then is stripped in the ordinary way. Small clearance was allowed in this case, but the difference in angle of the axes of the projection allowed them to be withdrawn successfully.

An instance of a complicated casting being produced by a stripping plate is shown in Fig. 7. In this case



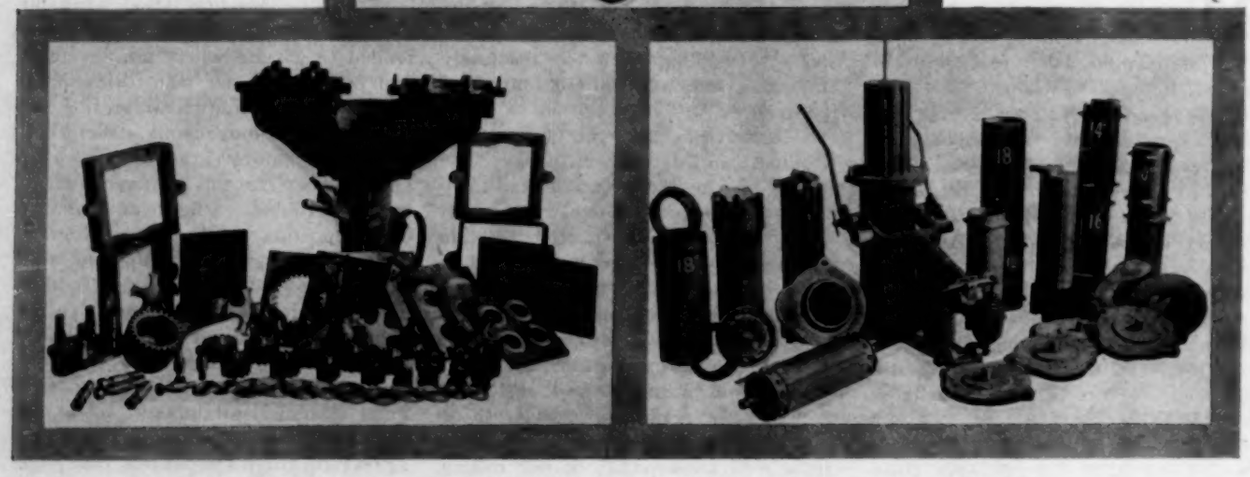


FIG. 1—SPECIAL ROLLOVER MACHINE FOR LARGE STOVE PLATE MOLDS

FIG. 2—STRIPPING PLATE MACHINE ARRANGED FOR DOUBLE DRAW

FIG. 3—LONG DRAW STRIPPING PLATE MACHINE WITH 20 CHANGES

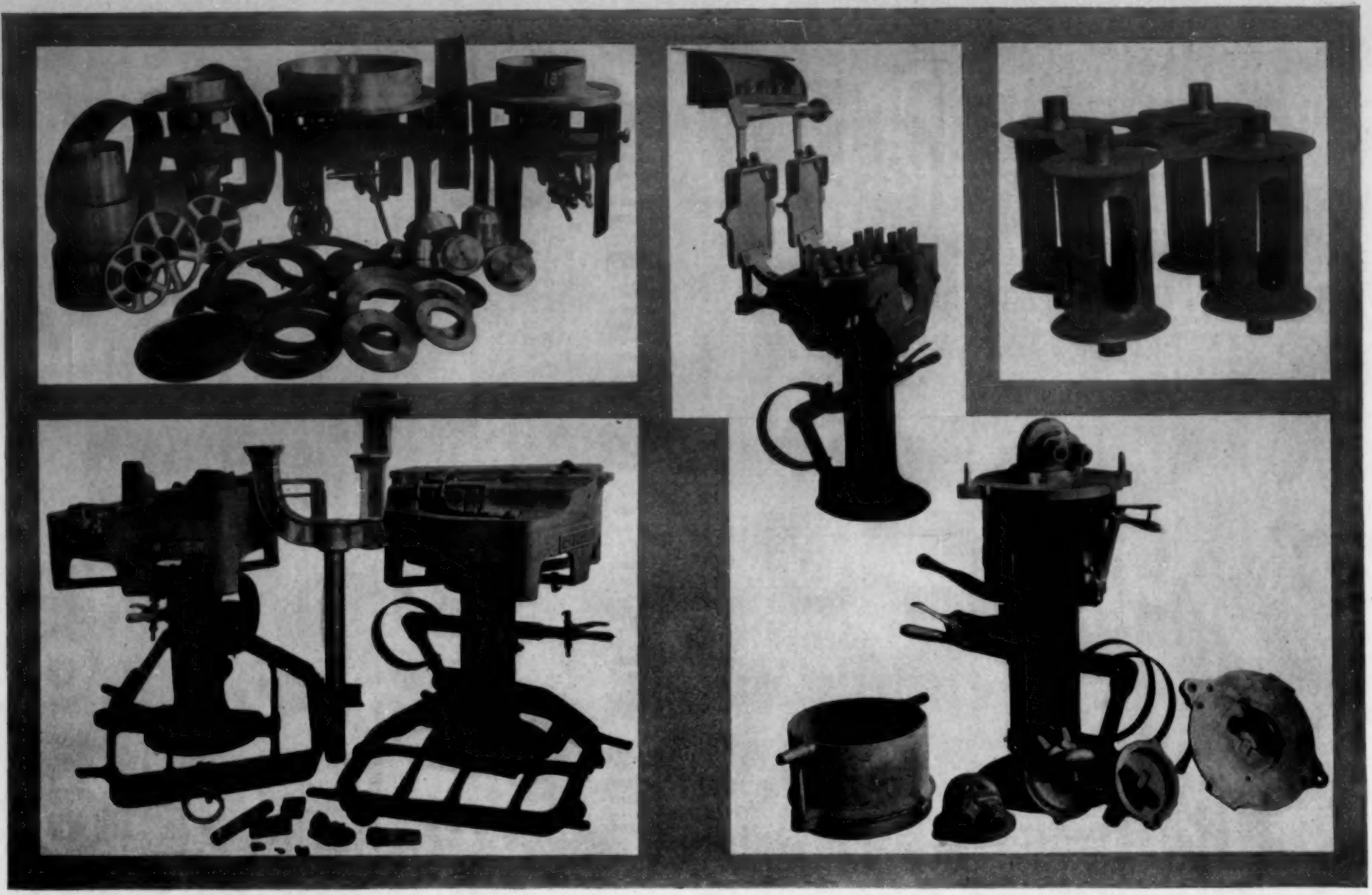


FIG. 4—MACHINES FOR MAKING PULLEY MOLDS IN VARIETY OF SIZES

FIG. 5 — STRIPPING PLATE MACHINE TO PRODUCE FOUR-PART MOLD FOR SPOOLS, FIG. 6

FIG. 6 — HOLLOW SPOOLS WITH SHAFTS, SHOWN GATED AS SHAKEN-OUT

FIG. 7—STRIPPING PLATE MACHINE EQUIPPED WITH IRREGULAR PATTERN, WITH STEEL PIPE CAST-IN

FIG. 8—COMPLICATED PATTERN MOUNTED ON A STRIPPING PLATE MACHINE

two machines were necessary on account of the irregular form of parting. The casting is the U-shaped portion in the center with a 2-inch pipe cast in. It is part of a windmill head. In this instance eight cores, shown in the foreground, were used. The two rings support the pipe.

A Number of Heads

One feature of these machines is that with one stand a number of heads, each carrying a different pattern, can be utilized. A single nut makes the adjustment. The standard is bored to a standard size to receive a piston which is supplied with brass shoes adjusted by screws and wedges to take up wear. As many as 10 different patterns may be arranged for mounting on a single style of machine, making it highly interchangeable. For foundries having a seasonal output that varies through the year, this is a great advantage.

A paramount consideration in the design of these machines is to save machine shop labor. This is accomplished by the use of chills and by doing the machine work on flasks instead of on the castings. In this endeavor chills are introduced to give a finished bearing surrounding every shaft that is cast-in. When the shaft is to be subsequently fitted, the bearing is left soft to permit of machining. Steel shafts are cast-in wherever possible, this being accomplished without breaking the castings as a result of cooling strains. Exact centers are provided on cope and drag to hold the shaft in position and to avoid eccentricity.

Unnecessary Machining Eliminated

An essential point when arranging a pattern on a machine is to eliminate all unnecessary machining. Frequently, parts of machinery formerly cast separately and assembled can be combined in one casting by proper arrangement of the stripping plate machine and careful core work. By the Dearsley molding machine process each machine is designed to produce cope and drag simultaneously, but when the partings are too irregular, this cannot be accomplished. In the Freeman foundry, match-plates are employed extensively, but when the number of castings required is sufficiently large, a special rig for a stripping plate is designed.

Interchangeable Flasks

Interchangeable, machined flasks are of as much importance as the machines and really become a part of the machine. Accurate work on the flasks reduces machine shop work on castings. Cores frequently are inserted in horizontal lugs or parts through a core support on the outside of the flask. Such cores may be set after the mold is closed to insure align-

Even in the core room the stripping plate principle has been applied in modified form to produce perfect cores. Often a casting, otherwise carefully produced, is ruined by the introduction of imperfect cores. In one instance in the Freeman core room a device is used to produce a hollow core with a pinion on the inner circumference. In this case the hub is drawn and then the pinion is stripped, leaving the remainder of the work to be done by hand molding, thereby eliminating the use of the machine.

Rail Failure Statistics for 1915

BY M. H. WICKHORST

THE American Railway Engineering Association has issued its annual report of rail failures for 1915. This report deals with the statistics of rail failures collected for the year ending Oct. 31, 1915, furnished by the railroads of the United States and Canada in response to a circular sent out by the American Railway Association. The information furnished by each railroad showed the number of tons laid of each year's rollings from each mill, the equivalent number of track miles, and the total number of failures that occurred in each year's rolling from the date laid until Oct. 31, 1915. It may be remarked that as a whole the returns this year were more complete and satisfactory than heretofore.

The failures were divided into four classes, namely, head, web, base and "broken". The reports cover rollings for 1910 and succeeding years, and the ages of the rollings would average in the track about the number of years shown below:

1910—5 years	1913—2 years
1911—4 years	1914—1 year
1912—3 years	1915—Several mths.

The tonnages represented by the statistics in this report are as follows:

Year rolled.	Bessemer.	Open hearth.	Total.
1910.....	647,616	969,075	1,669,691
1911.....	317,818	805,489	1,123,307
1912.....	230,318	1,235,974	1,466,292
1913.....	122,974	1,403,848	1,526,642
1914.....	52,837	976,852	1,029,689
1915.....	13,295	621,603	634,898

The equivalent track miles are as follows:

Year rolled.	Bessemer.	Open hearth.	Total.
1910.....	4,678.46	6,908.97	11,587.43
1911.....	2,263.75	5,717.42	7,981.17
1912.....	1,657.33	8,716.85	10,374.18
1913.....	998.05	9,670.54	10,668.59
1914.....	380.02	6,681.22	7,061.24
1915.....	99.12	4,187.14	4,286.26

It will be noted that the bessemer rails have continually become a smaller proportion of the total amount reported on.

The failures were tabulated with reference particularly to the performance of the rails made by the different mills and were classified successively in the following order: kind of steel (bessemer or open hearth), mill, year rolled, weight per yard, section and railroad. The totals were figured for the groups by the year rolled.

Lots of less than 1,000 tons (that is, less than 1,000 tons in any one year's rolling) were excluded from the tabulation, as they would unnecessarily extend the work and not materially change the group totals and averages.

A condensed table showing the failures of each year's rolling of each mill is given as Table I. It is interesting to note from this table the comparative performance of bessemer and open hearth rails for the several years' rollings. Figuring the failures per 100 track miles of open hearth rails as 100 for each of the years 1910, 1911, 1912 and 1913, the relative failures of the bessemer rails, together with the failures per 100 track miles, are shown below:

Year rolled.	Years service.	Failures per 100 track miles. O. H.	Bess.	Comparative failures. O. H.	Bess.
1910	5	153.1	236.9	100	154
1911	4	115.5	178.8	100	155
1912	3	46.0	66.9	100	143
1913	2	24.8	35.2	100	142

It will be noted that the bessemer failures per 100 track miles were about 50 per cent greater than those of the open hearth rails. It is probably also true that the open hearth rails were, in general, in more severe service, so that the actual difference under the same conditions may have been greater.

The comparison between open hearth and bessemer rails as obtained from the statistics in the 1913 and 1914 reports and this report are collected together below. The original

Abstract of Report No. 56 to the rail committee of the American Railway Engineering Association. The author, H. M. Wickhorst, is engineer of tests for the rail committee.

comparisons in the 1913 and 1914 reports compared the failures per 10,000 tons, but below the comparison is on the basis of failures per 100 track miles, although the difference is small. Bessemer failures compared with open hearth failures, the latter taken as 100, are as follows:

Year rolled.	Years service 2	3	4	5
1908	...	...	...	112
1909	...	...	195	188
1910	...	230	207	154
1911	249	291	155	...
1912	219	143	...	...
1913	142	...	...	...

The records are closed for the 1908, 1909 and 1910 rollings and it is interesting to note that both the bessemer and open hearth rails showed reductions in the number of failures in the successive years.

Effects of Vibration on Buildings

The preliminary report of an investigation on the effects of vibration in structures, recently issued by the Aberthaw Construction Co., Boston, reveals some interesting opinions regarding the stresses set up in industrial buildings by reciprocating machines. Inquiries were sent out to over 1,000 professional men and manufacturers asking for an account of their experience with the effect of vibration.

The 376 informative replies received indicated that vibration is generally recognized as a means of causing nervousness among certain classes of workers and of reducing the efficiency of machinery. The claim that workmen are affected comes, principally from textile and shoe manufacturers. One plant manager reports that he has had four different clerks leave his employ because they could not stand the vibration of the building. A shoe manufacturer writes that he has known of many instances of "operators on high speed shoe machines being obliged to stand on specially constructed stands in order to remove the vibration from their legs."

Several textile manufacturers reported instances of excessive breakage of threads due to vibration, necessitating a reduction of the speed of the looms. In one instance a loom that could not be run faster than 120 picks per minute in a building of standard mill construction, was successfully operated at 160 picks per minute in a building in which vibration was eliminated. A machine shop manager claimed that the grinding capacity of several large belted grinding machines was increased about 10 per cent by placing them on individual foundations which eliminated vibration.

The experience of practically all of the persons who replied to the inquiries indicated that in properly constructed reinforced concrete structures vibration is not a disturbing element, but that in buildings of timber construction considerable trouble from this source is encountered. Rubber pads and other shock absorbing devices seem to have been used with surprising success in a number of instances. The Aberthaw investigation will be continued until the subject has been thoroughly covered, at which time an exhaustive report will be issued.

Solenoid Control Relays

Solenoids for operating large carbon break or oil circuit breakers frequently require comparatively large currents in the closing solenoids. In such cases the contracts of the solenoid control switch which controls the operation of the solenoid, are not suited to operate the closing solenoid and it is necessary to use also, a control relay with its operating coil excited by the closing contacts of the control switch and the relay contacts in series with the closing solenoid.

The relay consists of a solenoid, plunger and contacts. There is a metallic connection, consisting of a small flexible lead, between the movable contact arm and its support. The contacts are kept clean by a wiping motion each time the relay is operated. The relay can be closed by hand, by an insulated button on the lower end of the relay plunger. This relay is made by the General Electric Co., Schenectady, N. Y.

Summary Showing Track Miles of Rail, Total Failures and Failures Per 100 Track Miles, Grouped by Miles and Years

Prepared by American Railway Engineering Association.

Mill.	1910 Track miles of rail laid.	1910 Failures Total.	1910 Failures Per 100 track miles.	1911 Track miles of rail laid.	1911 Failures Total.	1911 Failures Per 100 track miles.	1912 Track miles of rail laid.	1912 Failures Total.	1912 Failures Per 100 track miles.	1913 Track miles of rail laid.	1913 Failures Total.	1913 Failures Per 100 track miles.	1914 Track miles of rail laid.	1914 Failures Total.	1914 Failures Per 100 track miles.	1915 Track miles of rail laid.	1915 Failures Total.	1915 Failures Per 100 trk. mls.
Bessemer Rail.																		
Algoma	63.98	90	140.7										82.77	18	21.7			
Cambria	166.18	674	405.6	63.24	161	254.6	50.66	64	126.3	24.99	5	20.1	11.56	1	8.6	12.86	0	0.0
Carnegie	840.16	4,048	482.1	443.34	726	163.7	26.08	37	141.9	221.50	66	29.8	22.74	0	0.0	.....	.	...
Illinois	1,629.87	3,356	205.9	1,044.32	1,912	183.1	846.33	464	54.8	388.88	110	28.3	91.94	19	20.7	38.28	0	0.0
Lackawn.	1,590.43	3,446	219.4	489.37	1,397	285.5	181.37	184	101.5	125.86	33	26.2	72.43	0	0.0	26.37	0	0.0
Maryland	387.84	730	183.2	370.83	245	66.1	552.89	359	64.9	236.92	138	58.2	98.58	15	15.2	21.79	0	0.0
Totals	4,678.46	12,344	236.9	2,411.10	4,441	184.2	1,657.33	1,108	66.9	998.05	352	35.2	380.02	53	15.1	99.12	0	0.0
Open Hearth Rail.																		
Algoma	14.49	2	13.8										115.78	22	19.0	218.23	3	1.4
Bethlehem	656.09	2,171	330.9	733.53	1,846	251.7	801.71	418	52.1	957.71	258	26.9	573.96	22	3.8	270.46	0	0.0
Cambria	199.52	401	201.0	270.51	516	227.7	565.23	420	74.3	617.23	314	49.5	360.41	58	15.8	100.59	1	1.0
Carnegie	164.19	166	101.1	333.81	411	123.1	595.27	329	55.3	676.61	132	19.4	381.04	21	5.5	295.68	1	0.3
Colorado	1,267.34	772	60.9	801.61	422	52.6	1,423.82	792	55.6	1,067.08	117	11.0	810.37	30	3.7	458.36	1	0.2
Dominion	256.33	410	159.9	217.52	353	162.3	183.72	62	33.7	.....	...	....	.....	..	....	.....	.	...
Illinois	2,370.76	4,888	206.2	1,280.27	1,381	107.7	2,098.05	813	39.2	2,750.73	606	21.9	1,450.76	169	11.6	1,299.92	1	0.1
Lacka.	214.96	320	148.9	418.09	454	108.6	1,099.48	435	39.6	1,301.40	408	31.4	725.10	13	1.8	535.91	1	0.2
Maryland	247.39	405	163.7	394.37	231	58.5	55.18	10	18.1	283.47	210	74.1	420.48	56	13.3	167.53	14	8.3
Pa.	385.21	477	123.8	158.01	188	119.0	607.30	167	27.5	586.24	123	21.0	281.03	23	8.2	164.43	0	0.0
Tenn.	1,132.69	625	55.2	961.93	392	40.8	1,287.09	565	43.9	1,430.07	236	16.5	1,562.29	117	7.5	676.03	9	1.3
Totals	6,908.97	10,637	154.0	5,569.65	6,194	111.2	8,716.85	4,011	46.0	9,670.54	2,404	24.8	6,681.22	531	7.9	4,187.14	31	0.8
Summary.																		
Tot'l Bes.	4,678.46	12,344	236.9	2,411.10	4,441	184.2	1,657.33	1,108	66.9	998.05	352	35.2	380.02	53	15.1	99.12	0	0.0
To. O. H.	6,908.97	10,637	154.0	5,569.65	6,194	111.2	8,716.85	4,011	46.0	9,670.54	2,404	24.8	6,681.22	531	7.9	4,187.14	31	0.8
Grd tot'l	11,587.33	22,981	198.5	7,980.75	10,635	133.3	10,374.18	5,119	49.3	10,668.59	2,756	25.8	7,061.24	584	8.2	4,286.26	31	0.7

WHAT'S WHAT and WHY

Don't Ask Yourself-Ask Us!

Questions from our Readers answered by Experts

Aluminum as a Protective Coating

Is aluminum ever applied to metals as a preservative coating?

Aluminum can be applied to the surface of metals by a process of electroplating. This process, however, is extremely difficult due to the high voltage required and also to the readiness of the aluminum coating to redissolve. The metal-work on the tower of the Philadelphia city hall, for example, consists of copper, 14 ounces per square foot, coated with an alloy of aluminum and tin, 2½ ounces per square foot. Aluminum-coated conductor pipes are being made commercially which are said to be as durable as copper and as rust-proof as aluminum.

Metal Car Doors

I have been told that some manufacturers of steel passenger cars are replacing sheet metal doors with those made of cast aluminum. On account of the high price of aluminum it would seem that the car builders are not warranted in using such an expensive material for doors. Can you explain why aluminum is being used?

When steel passenger cars were first built, the doors were made of plates and sheets to conform with the structure of other parts of the car. After some of the first cars had been in service for a comparatively short time, it was found that the doors were deteriorating rapidly. Investigation showed that moisture rapidly collected in the space between the sheets forming the door, and in a number of instances when holes were bored in the bottom of door, almost a quart of water was removed. The doors became useless so long before the other parts of the cars showed any signs of wear, that it was decided to try other materials.

The Pennsylvania Railroad Co. experimented with aluminum doors made from two thin castings bolted together. Although the complete door is 1¼-inches thick at the thickest part, the castings in many places are only ⅛-inch thick. About 107 pounds of aluminum is used in casting a complete door. Aluminum has an advantage over sheets in that it does not rust. Moreover, an aluminum door if distorted or damaged in a wreck, may be melted up, practically all of the metal being reclaimed. The casings for deck windows of passenger cars are now being made of aluminum.

Naval Consulting Board

Will you please furnish us with a list of the members of the naval consulting board?

The naval consulting board is constituted of a chairman and an assistant, and two members from each of 11 organizations as follows:

Thomas A. Edison, chairman, Orange, N. J.; Dr. M. R. Hutchison, assistant to the chairman, Orange, N. J.

American Chemical Society:—Dr. W. R. Whitney, General Electric Co., Schenectady, N. Y.; Dr. L. H. Baekland, Yonkers, N. Y.

American Institute of Electrical Engineers:—Frank J. Sprague, 165 Broadway, New York City; Benjamin G. Lamme, Westinghouse Electric Co., Pittsburgh, Pa.

American Mathematical Society: — R. S. Woodward, president Carnegie Institute, Washington; Prof. Arthur G. Webster, Clark University, Worcester, Mass.

American Society of Civil Engineers:—A. M. Hunt, 55 Liberty street, New York City; Alfred Craven, Tribune building, New York City.

American Society of Mechanical Engineers:—Spencer Miller, 96 Liberty street, New York City; William LeRoy Emmet, General Electric Co., Schenectady, N. Y.

American Aeronautical Society: — Matthew B. Sellers, 801 N. Arlington avenue, Baltimore; Hudson Maxim, 698 St. Marks avenue, Brooklyn.

Inventors Guild:—Dr. P. C. Hewitt, first vice chairman, Ringwood, N. J.; Thomas Robins, secretary, 13 Park Row, New York City.

American Society of Automobile Engineers:—Howard E. Coffin, Hudson Motor Co., Detroit; Andrew L. Riker, Fairfield, Conn.

American Society of Aeronautic Engineers:—Elmer A. Sperry, Manhattan Bridge Plaza, Brooklyn.

American Institute of Mining Engineers (metals):—W. L. Saunders, second vice chairman, 11 Broadway, New York City; Benj. B. Thayer, 42 Broadway, New York City.

American Electrochemical Society:—Dr. J. W. Richards, South Bethlehem, Pa.; Lawrence Addicks, Room 2, 126 Liberty street, New York City.

Sheets Used in Manufacture of Automobiles

What is the approximate consumption of sheets in the manufacture of automobiles?

The manufacture of automobiles will use about 300,000 tons of sheets during the first half of 1917, according to estimates of men who are familiar with the requirements of the motor car makers. This would mean a consumption of 600,000 tons for the year of 1917, which is a comfortable increase over the amount used in 1916. Approximately half of this tonnage will consist of pickled stock.

Rating of Steam Hammers

Please advise us of the method used by manufacturers in designating the sizes of steam hammers.

Steam hammers are rated according to the actual scale weight of the falling part. For instance, a 6,000-pound hammer is one in which the weight of the piston and hammer head is 6,000 pounds.

Reports on Building

We often find in your columns advance reports in regard to new buildings, which we are unable to get from any other source, although we pay liberally for reports on new construction. If consistent, we would appreciate it very much if you would advise us in regard to your methods of obtaining these reports.

The Iron Trade Review has correspondents in all the leading centers of the United States and is constantly receiving reports from them in regard to new construction, including not only entirely new plants, but additions and improvements to existing plants. This information is obtained by the correspondents from many sources and every effort is exerted to make it absolutely correct.

Is Sulphur Injurious to Steel?

More Light is Thrown on This Interesting Question by the Results of Tests Described in This Article—The Author Believes That High Sulphur Content Does Not Lower Tensile Strength

BY CARLE R. HAYWARD

SULPHUR has long been one of the banes of the steel manufacturer and often no effort and expense have been spared in order to reduce it to a small per cent in the finished product. This condition is due to a general conviction that in many cases where steels have failed in service, sulphur has been the cause. But there has been a growing feeling in recent years that the verdict against sulphur has been unnecessarily severe. In cases of segregation it was present in augmented amounts along with other impurities, but it had not caused the segregation. High sulphur in pig iron is caused by poor furnace conditions and the sulphur is merely one indication of an iron that has not been properly reduced. No amount of subsequent treatment under oxidizing conditions in the open-hearth furnace can remedy the defects, although the per cent of sulphur may be considerably reduced. In other words, the causes of bad steel can frequently be traced back to bad pig iron, and sulphur is merely one indication that the pig iron is bad. The writer recently visited a steel plant where a mass of evidence had been accumulated which substantiated this fact, and the superintendent was emphatic in stating that high sulphur was not harmful provided the steel was not otherwise poor due to insufficient reduction in the blast furnace.

The presence of a moderate amount of sulphur is desirable from the standpoint of the man who machines the steel. The low sulphur material drags and the production of a smooth surface is very difficult. A slight increase in sulphur enables the machinist to produce a smooth surface without difficulty. Since, therefore, such large quantities of steel are subjected to machining, it becomes highly important that the sulphur controversy should be settled, and if its presence is proved to be harmless the ban on it should be lifted.

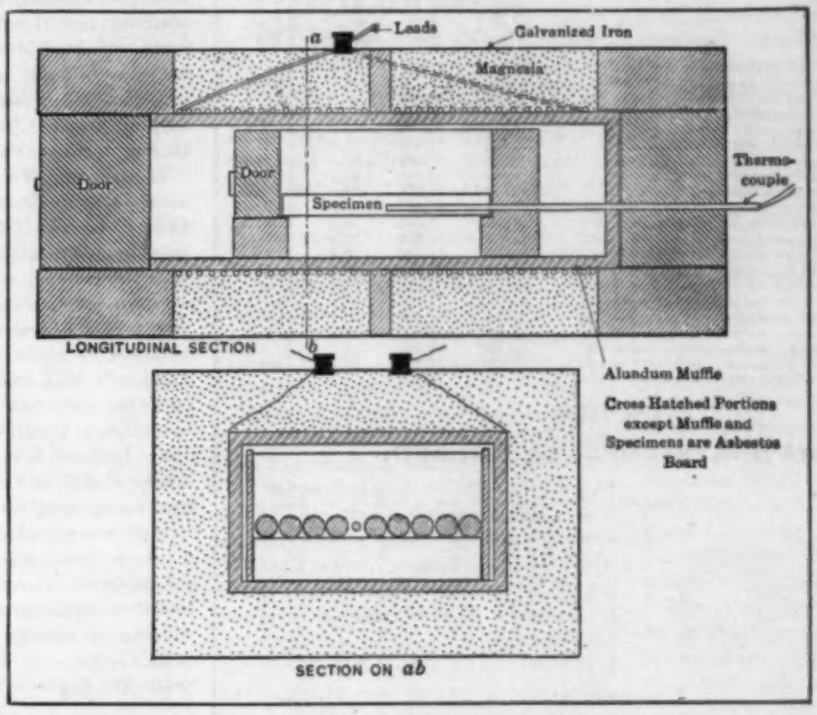


FIG. 1—HEAT-TREATMENT FURNACE

Among the recent papers on the effect of sulphur on steel is one by Dr. J. S. Unger, manager of the central research bureau, Carnegie Steel Co. The results of an exhaustive series of tests are given and the conclusion states: "The author does not advocate paying any attention whatever to sulphur content in steel, but believes firmly that a steel containing less than 0.100 per cent is not necessarily bad, and that it will show little, if any, difference in quality when compared with the same steel of much lower sulphur, other conditions being the same."

The present investigation was undertaken at the suggestion of A. H. Annan of the Rhode Island Tool Co., who co-operated by furnishing the steel and machining the specimens. The results are presented as a contribution to the general knowledge on the subject. It was planned to use three steels of different sulphur content but with the other elements of the same. The manganese was an exception, however, for with this element part is in the form of MnS existing free in the steel and the remainder is dissolved in the steel. It is evident, therefore, that the manganese should vary but that the amount in excess of MnS should be constant in the different steels. The steels finally selected were in the form of ¾-inch round bars. Two bars of each grade were required to furnish sufficient specimens. The analyses are shown in Table I.

In order to make a comparison of the steels under different conditions it was decided to heat all the specimens to a temperature just above the critical range, quench in water, and reheat different lots to 300, 400, 500 and 600 degrees Cent., respectively. For this purpose the bars were cut in 7-inch lengths, which was sufficient for tensile specimens and specimens for microscopic examination.

The furnace used is shown in Fig. 1. The muffle is made of alundum and is 2 inches high, 9 inches wide and 16 inches long. It is wound with No. 15 excello resistance wire. In order to obtain uniform heating of

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the specimens, they were supported on an asbestos rack, as shown. Asbestos shields were placed on the sides and ends of the rack so that the specimens in the furnace were practically in a muffle within a muffle. A platinum, platinum-rhodium thermocouple was introduced through the back of the muffle into the center of the heating chamber and connected to a Siemens and Halske recording galvanometer.

Table I.

Analyses of Test Steels

Mark.	Carbon, Per cent.	Total Manganese, Per cent.	Excess Manganese, Per cent.	Phosphorus, Per cent.	Silicon, Per cent.	Sulphur, Per cent.
1	0.18	0.55	0.48	0.007	0.01	0.038
1A	0.18	0.57	0.50	0.009	0.02	0.041
2	0.17	0.67	0.52	0.008	0.01	0.086
2A	0.18	0.70	0.55	0.010	0.03	0.087
3	0.18	0.80	0.54	0.006	0.02	0.152
3A	0.17	0.80	0.55	0.011	0.03	0.148

Table II.

Tests of Tensile Strength

		Yield point, lb. per sq. in.	Breaking load, lb. per sq. in.	Elongation, per cent in 2 in.	Reduction of area, per cent.
L	Heated to 860° C. and quenched in ice water	57,900	85,600	23.5	63.1
M	Heated to 860° C. and quenched in ice water	53,600	77,700	27.7	70.1
H	Heated to 860° C. and quenched in ice water	56,900	86,000	22.0	60.7
L	Heated to 860° C. and cooled in still air	43,200	58,400	41.5	67.8
M	Heated to 860° C. and cooled in still air	46,000	58,000	41.3	68.5
H	Heated to 860° C. and cooled in still air	42,600	59,400	39.0	63.9
L	Heated to 860° C. and cooled in furnace	36,500	52,600	40.5	63.2
M	Heated to 860° C. and cooled in furnace	36,800	53,000	40.3	61.6
H	Heated to 860° C. and cooled in furnace	35,100	55,000	38.0	63.0
L	Quenched at 860° in ice water. Reheated to 300°	55,900	75,675	26.5	70.0
M	Quenched at 860° in ice water. Reheated to 300°	59,500	75,000	26.7	71.4
H	Quenched at 860° in ice water. Reheated at 300°	57,500	87,800	21.5	60.7
L	Quenched at 860° in ice water. Reheated to 400°	60,300	76,300	28.8	72.1
M	Quenched at 860° in ice water. Reheated to 400°	62,600	76,600	26.3	70.0
H	Quenched at 860° in ice water. Reheated to 400°	62,400	83,200	22.3	62.4
L	Quenched at 860° in ice water. Reheated to 500°	57,000	72,700	32.0	73.5
M	Quenched at 860° in ice water. Reheated to 500°	59,700	73,300	29.0	71.8
H	Quenched at 860° in ice water. Reheated to 500°	60,900	78,000	26.0	67.0
L	Quenched at 860° in ice water. Reheated to 600°	52,200	68,800	34.2	75.5
M	Quenched at 860° in ice water. Reheated to 600°	53,600	71,100	33.0	73.5
H	Quenched at 860° in ice water. Reheated to 600°	55,200	74,600	30.5	70.7

Table III.

Effect of Treatment on Strength

	Yield point.			Breaking load.			Elongation.			Reduction of area.		
	L	*M*	*H*	*L*	*M*	*H*	*L*	*M*	*H*	*L*	*M*	*H*
Quenched in ice water	1	3	2	2	3	1	3	1	2	3	1	2
Cooled in still air	2	1	3	2	3	1	1	2	3	2	1	3
Cooled in furnace	2	1	3	3	2	1	1	2	3	2	3	1
Reheated to 300°	3	1	2	2	3	1	3	1	2	3	1	2
Reheated to 400°	3	1	2	3	2	1	1	2	3	1	2	3
Reheated to 500°	3	2	1	3	2	1	1	2	3	1	2	3
Reheated to 600°	3	2	1	3	2	1	1	2	3	1	2	3
Totals	17	11	14	18	17	7	11	12	19	13	12	17
Order of totals	3	1	2	3	2	1	1	2	3	2	1	3

Table IV.

Result of Shock Tests

Sulphur content—Treatment.	Average breaking shock, ft. lbs. per sq. in.
L Heated to 480° and quenched in cold water	526
M Heated to 480° and quenched in cold water	518
H Heated to 480° and quenched in cold water	470
L Heated to 480° and cooled in still air	456
M Heated to 480° and cooled in still air	519
H Heated to 480° and cooled in still air	416
L Heated to 480° and cooled in furnace	279
M Heated to 480° and cooled in furnace	355
H Heated to 480° and cooled in furnace	273
L Quenched at 480°. Reheated to 300°	605
M Quenched at 480°. Reheated to 300°	543
H Quenched at 480°. Reheated to 300°	439
L Quenched at 480°. Reheated to 400°	597
M Quenched at 480°. Reheated to 400°	546
H Quenched at 480°. Reheated to 400°	450
L Quenched at 480°. Reheated to 500°	682
M Quenched at 480°. Reheated to 500°	561
H Quenched at 480°. Reheated to 500°	473
L Quenched at 480°. Reheated to 600°	727
M Quenched at 480°. Reheated to 600°	597
H Quenched at 480°. Reheated to 600°	506

The procedure in heat treatment was as follows: The furnace was heated to 880 degrees Cent. and nine specimens introduced. This caused the temperature to fall to 550 degrees Cent., and it took about 40 minutes to again reach 880 degrees. When the latter temperature was reached it was maintained constant for 15 minutes, after which the specimens, except as noted below, were quenched in water and a new lot introduced into the furnace. This was continued until all but 18 of the specimens had been treated. Nine of these, consisting of three high, three medium and three low sulphur steels, were removed from the furnace and allowed to cool in air. The remaining nine, consisting of three of each sulphur content, were allowed to cool in the furnace.

In drawing the quenched specimens at the various temperatures, the procedure was as follows: The furnace was heated to 600 degrees Cent. and nine specimens, three of each sulphur content, were introduced. The temperature fell and it required about 30 minutes to come back to 600 degrees Cent. It was maintained here for 10 minutes and then the specimens were withdrawn and quenched in water. The furnace was cooled to 500 degrees Cent. and another set of nine specimens was introduced. When the temperature had regained 500 degrees Cent. it was maintained constant for 10 minutes and then the specimens were withdrawn and quenched. Following a similar procedure, sets of nine specimens were treated at 400 and 300 degrees Cent., respectively.

Tensile Tests

After sawing off ¾ inch from each piece for microscopic examination, standard test specimens were prepared with 2-inch gage length, 0.505-inch diameter and threaded ends. These were pulled in an Olsen machine in the testing laboratory of the Massachusetts Institute of Technology. The averages of the results obtained are tabulated in Table II. The designations *L*, *M* and *H* refer to low, medium and high sulphur content. There is not sufficient variation in the results to make an effective plot, but Table III summarizes the figures by giving the order in which they occur from high to low.

After concluding the tensile tests, it was thought desirable to determine the effect of varying sulphur content on specimens subjected to shock.

Through the kindness of the testing department of the Watertown arsenal, the use of the Charpy machine was obtained for this purpose. The remaining ¾-inch stock of the bars was sawed into 2-inch lengths and the specimens subjected to heat treatment in sets of three under the same conditions that obtained in the case of the tensile specimens. After heat treatment, the specimens were machined to conform to the following specifications:

Length 55 millimeters, cross-section 10 x 10 millimeters, notch across one side, midway between the ends, 1 millimeter wide. Radius of cutter edge, 2/3 millimeter.

The Charpy machine consists of a heavy pendulum which drops from a fixed height, strikes the specimen supported at each end and breaks it at the notch. The pendulum then continues its swing and the height it reaches is registered. Knowing the weight of the pendulum, the height it falls and the height it rises, a simple calculation gives the energy consumed in breaking the specimen. The results obtained are given in Table IV.

Conclusions

Table III, which expresses the summary of the tensile tests, shows that the high-sulphur steel has for each treatment the highest breaking load while the yield point ranks first for two treatments, second for three and third for two. From this we may conclude that the sulphur does not lower the tensile strength.

The figures for elongation and reduction of area show that there is little difference in ductility between the low and medium sulphur steels, but the ductility of the high-sulphur steel is slightly lower than the other two for most of the treatments.

The average figures for the shock tests, except for the air and furnace-cooled specimens, are highest for each treatment in the case of the low-sulphur steels and lowest for each treatment for the high-sulphur steels. The widest difference appears in the steels which have been quenched and reheated.

It is difficult to draw definite conclusions from the results because of the newness of the shock test and the difference of opinion among engineers regarding its value. The tensile tests are not unfavorable to steels with moderate amounts of sulphur, while the shock tests show a decided falling off in strength as the sulphur increases. Until the interpretation of the results from the Charpy machine is more fully understood, it is impossible to say to which set of tests the most importance should be attached.

Further light might be thrown on the subject by making alternate stress or fatigue tests. It would be important to learn whether the results would confirm the tensile or shock tests. Unfortunately, however, the stock of steels used in the previous work was exhausted, and whatever the results of the fatigue tests there would be an uncertainty in their interpretation because of difference in stock. It was, therefore, decided not to include this series in the present investigation.

Extended Use of Electric Furnaces

Until the past year the use of electric furnaces in Sheffield, Eng., was limited and not more than 10 were in operation in all the steel works located here. That Sheffield manufacturers are alive to the possibilities of the newer process is shown by the fact that during the calendar year 1915 at least 15 additional electric furnaces were installed or are in process of installation, and a large number of manufacturers have the erection of such furnaces under consideration. Owing to the introduction of these furnaces a largely increased output of alloy steel for the construction of automobiles, aeroplanes, and small castings has resulted, and at present there is a large demand for these types of steel. Numerous experiments have and are being made for the melting of high speed steel in electric furnaces, but Sheffield manufacturers are not yet convinced that this process produces as good an article as that obtained by the crucible process that has been in use for so many years. The principal drawback found here to the electric process for the latter steels is the undue size of the melts. It is claimed that better results are obtained in teeming the smaller quantities handled by the crucible process.

Book Review

Bridge Engineering, by J. A. L. Waddell; 2,177 5 x 9-inch pages in two volumes; cloth; published by John Wiley & Sons, Inc., and furnished by *The Iron Trade Review* for $10.00 net.

This new book on bridge engineering is by an author of recognized authority, whose exceptional experience and thorough knowledge of his subject ably fitted him for the task. The new treatise covers the entire field of this phase of engineering and should prove useful to all engaged directly or indirectly in the designing and construction of bridges. The principles of design are explained and many practical hints are given which otherwise might not be learned without years of experience. With the various tables and diagrams it is possible to compute rapidly the cost of nearly every kind of a bridge and for structures of any size and length yet attained, regardless of the character of the imposed load. Data are given for determining, at least approximately, the weights of metals required by the use of alloy steels of various elastic limits when used for spans of unprecedented weight and length. All types of substructures are described and illustrated; specifications are given for design and advice for the particular purpose for which each type is adapted. The protection of metal work is dealt with at length, and its importance emphasized. The best methods of designing of reinforced concrete bridges is fully explained, but this does not include any theory except a small portion essential to the comprehension of the fundamental formulae. The book also includes an exhaustive glossary of technical terms used in bridgework.

Furnace Tapping With Electric Drills

In the modern blast furnace the practice of entirely tapping the charge with the humanly-swung sledge and drill has almost disappeared. The advent of hydraulic and electric drills has done much to eliminate the former hazardous practice. Not only are mechanically operated drills more safe but they also embody greater speed, which is an important consideration.

The Van Dorn Electric Tool Co. has recently perfected a portable drill for tapping blast furnaces. It is said that this tool is very satisfactory, being free from vibration and easy to handle. The actual time consumed in tapping a furnace with this machine is said to be about five minutes, the time of drilling requiring about two minutes, as the drill is withdrawn when within 1 inch of the iron. The balance of the operation is made with the usual tapping rod and sledge.

The drills used are about 10 feet long, and of this 10 feet, 3 feet are twisted. The diameter of the drill is about 2½ inches. The adaptability of this kind of tool for tapping is evident, as it is possible to drill a 2½-inch hole without the likelihood of stalling. The control of this apparatus is unique. The switch is so arranged in the handle of the drill that as soon as the operator drops the handle the power is immediately shut off.

The Manganese Ores of Bukowina

The Importance of These Deposits is Best Illustrated by the Fact that the Province of Bukowina Has Changed Hands Three Times Since War Was Declared

BY HERBERT K. SCOTT

TOWARD the close of the year preceding the outbreak of the war, the author spent some time in Bukowina, visiting the manganese ore deposits of the Dorna Watra district. In view of the importance of the manganese supply of the countries now at war, this paper deals with deposits which, while not perhaps of such great importance in normal times, have been of considerable value to Austrian steel works from the time the Russian troops were forced out of the Bukowina until the end of June, 1916, when that province was again occupied by the Russians.

Table I

Analyses of Dried Jackobeni Ore

	Arschitza Rhodochrosite.	Brazilian Rhodochrosite.	Arschitza Siliceous Schist
Silica	14-68	11-80	95-65
Protexide of manganese	51-12 (sol. in HCl)	47-52	0-09 (sol. in HCl)
Protoxide of manganese	1-11 (insol. in HCl)		nil
Peroxide of iron	2-19	..	0-60
Alumina	0-96 (with any T_2O_3)	7-50	1-73
Lime	4-15	3-76	nil
Magnesia	traces	6-27	traces
Carbonic acid	23-12	22-62	....
Combined water	2-93	..	1-45 (with some cabonaceous matters)
Manganese metal	40-56	36-90	0-070
Iron	1-53	..	0-48

Table II

Analyses of Arschitza and Brazilian Rhodochrosite

	Washed Ore. 1st Grade. Per cent.	2nd Grade. Per cent.	Average Per cent.	Manganese Waste. Per cent.	Manganese Mud. Per cent.
Manganese	44-80	41-90	42-90	27-90	28-20
Iron	11-70	12-24	12-06	17-04	12-12
Silica	5-50	8-05	7-20	20-30	29-10
Phosphorus	0-365	0-430	0-41	0-534	0-390

Before war broke out, the world's annual consumption of 50 per cent manganese ore was 2,000,000 to 2,500,000 tons, practically all of which was produced in the Caucasus, India and Brazil, in the proportion of four, five and one. The closing of the Dardanelles stopped shipment of Caucasian ore, leaving the output of India and Brazil at the disposal of the allies and the United States, the production of India going principally to the allies, while the mineral from South America is being taken mostly by the United States.

For the years 1912 and 1913 the quantity and origin of manganese ore imported by Germany were as follows:

	1912. Tons.	1913. Tons.
Russia	340,000	448,000
India	128,000	180,000
Brazil	21,000	23,000
Spain	25,000	29,000
	514,000	680,000

Germany produced in 1912, 17,000,000 tons, and in 1913, 18,000,000 tons of steel. At the present time the output of her steel works is believed to be at about the rate of 15,000,000 tons per annum. A part of the manganese ore imports, probably 25 per cent of the total, was used for the production of ferro-manganese for export. Austria imported in 1911, 78,790 tons of manganese ore, of which 52,143 tons came from Russia. This country will probably be producing steel now at the same rate as in 1911, about 2,500,000 tons per annum.

Before the high grade ores from Russia, India and Brazil were placed on the market, a number of manganese ore deposits were worked in Germany, but during recent years they could not, by reason of their pockety character, compete in price with the imported ores, and at the time war broke out their production was negligible. There are, however, a number of manganiferous iron ore deposits in Germany, the mineral from which is largely used for the manufacture of spiegeleisen. During the year 1911 the total production of these deposits amounted to over 3,000,000 tons, containing up to 30 per cent manganese, of which, however, only 300,000 tons had contents of 20 per cent and over, the greater part giving from 2 to 12 per cent manganese. As in Germany, and probably for the same reason, the production of manganese ores in Austria-Hungary never appears to have been on a large scale. From several publications the author has obtained the following particulars of manganese ore occurrences in that empire, other than those of the Dorna Watra district:

1.—Carnioles at Vigunsica. The mineral is rhodonite and contains 45 per cent manganese. It occurs in irregular bands in the Triassic schists.

2.—Bohemia at Platten. The ore occurs as films and "stockwerke" in granite and mica-schists.

3.—Istria at Kroglje (near Donina). The mineral is reported to contain 40 per cent manganese.

4.—Styria at Kaskogerl. The ore is found in Silurian limestone as dialogite.

5.—Hungary at Felso-Bisso. The mineral occurs in beds as dialogite.

6.— Bosnia at Cevljanovio and Derazevic, near Serajevo. The ore exists in the Triassic schists. The mineral is pyrolusite and psilomelane, and contains about 46 per cent manganese.

The average annual output of manganese ore for the years 1909-1913 was: Austria, 15,465 tons; Bosnia and Herzegovina, 4,450 tons; and Hungary, 13,737 tons. Recently it was stated by Dr. Petersen, assistant sec-

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retary of the German Iron and Steel Institute that the necessary supply of manganiferous ore for the production of spiegeleisen and ferro-manganese during the war had been assured, and that a suitable substitute for manganese had been found for the deoxidation of the steel bath. It is obvious from the above statement that the production of manganese ore in Germany and Austria must have increased by an appreciable degree, especially since the question of cost is of little importance at the present time.

Location of the Deposits

The manganese ore bodies are situated on the slopes of the Carpathian mountains in the neighborhood of the town of Dorna Watra, a watering place near the frontier between Bukowina and Roumania. The principal deposit, that of Arschitza, is southeast of the village of Jackobeni, and the others, of less importance, known as Orata, Oitza Krlibaba, Putchos and Valaputna, occur to the north of Jackobeni; those of Teresia, Rosch and Sara Dorna, lie in a southerly direction near the Roumanian frontier, as shown in Fig. 1. The manganese ore properties were owned and operated in 1913 by the Bukowina Greek Oriental church fund, known as the "Religionsfond". Originally the properties belonged to Manz von Mariensee, who built three blast furnaces at Jackobeni as well as puddling furnaces at other places in the Bistritz valley where water power was available. His operations appear to have been extensive but were not successful. In 1860 he met with financial difficulties, and from that date until 1870 the property was administered by his creditors. In 1870 the "Religonsfond" acquired the whole of the assets, which included large areas of forest land, the iron works already referred to, the manganese ore deposits at Jackobeni, and an iron pyrites mine at Louisenthal. The church fund never operated the iron works. Only one of the blast furnaces was standing when the author was in the district, and the puddling establishments had all been dismantled.

Until the construction of the railway from Hatna on the Lemberg-Bucharest line to Dorna Watra, the present terminus, the Jackobeni manganese ore property was operated on a small scale, but about the end of the last century it was developed by underground work, and an ore-dressing plant was constructed. The railway reached Jackobeni in 1902, and from that year the output increased, the average annual export during the years 1906 to 1912 being 13,600 tons. Practically the whole of the exploratory work carried out by von Mariensee on the different outcrops of manganese ore was undertaken, it was said, in order to discover iron ore for use in his blast and puddling furnaces, but the phosphorus and manganese in the Jackobeni limonite must have prevented its successful utilization. There did not seem to be any iron ore deposits of importance in the district, and one could only assume that at the time the iron industry was projected the outcrop at Arschitza appeared to consist of suitable iron ore, and that the difference between iron and manganese was not well appreciated then.

The manganese and iron ores are shown in the geological map of Paul as extending along the sides of the Bistritz valley from Kirlibaba to Sara Dorna on the Roumanian frontier. The most important strata in the district were crystalline metamorphic rocks which included hornblende schists, and were called upper mica schists, to distinguish them from the lower mica schists to the northeast, which included quartzitic and chloritic members. To the west were narrow exposures of the Lower Trias and Carboniferous age. In the upper mica schists a band of great thickness of a siliceous schistose rock occurred, which in places outcropped on the flanks of the mountains and elsewhere cut across them. The sili-

FIG. 1—MAP OF BUKOWINA, SHOWING POSITION OF MANGANESE ORE DEPOSITS

ceous schist enclosed, in many places, lenticular bodies varying in size up to a maximum of 100 meters in length and 40 meters in width, containing oxides of manganese and iron, which had attained their greatest development on the slopes of the mountains where the rock had been most exposed to the action of organic agencies, and was not far removed from the mica schist footwall which, from its impervious character, had kept the meteoric waters in the siliceous schist. In the center of the manganiferous zone, near Jackobeni, were the principal deposits of Arschitza and Argestru. At these places, three principal lenses of ore had been developed, which had a northwest strike and at the surface appeared to be closely associated, but in depth became thinner and spread out in a fan-shaped manner. The middle lens had an inclination of 30 degrees, while the others dipped from 40 degrees to 50 degrees. On the west side of the Argestru valley evidence of a fourth lens was visible, which showed mica schists at both the foot and the hanging wall. At the Teresia quarry, to the southeast of Dorna Watra, a large lenticular mass of ore, which at the surface was 150 meters in length and 30 meters in thickness, had been quarried. The dip of the ore body was about 20 degrees and its strike southeast. It rested on the mica schist as at Arschitza. At Rosch, Sara Dorna and Valaputna deposits of a similar character occurred and were examined by the author, but in each case the work carried out was limited in extent, and little information regarding their geological characteristics was available.

At Arschitza a large quarry had been made at the summit of the hill, and iron and manganese ore were being excavated, first, it was said, to supply the blast furnace at Jackobeni, and second, for export. It follows, therefore, that only the more siliceous parts of the ore body were visible at the surface, but it was possible to see the segregated masses and small lenses of manganese and iron ores in the open pit working. At the Teresia quarry similar conditions could be observed at the north end, where the concentration of the manganese and iron ore in the joints and crevices in the original rock was indicated, as well as vughs containing finely divided residual silica. In the underground workings accessible at Arschitza, the ore occurs in much the same manner as at the surface, although in places a mineral locally known as rhodonite, and which proved to be carbonate of manganese, associated with some silicate, is met with in appreciable quantities. At several points there is evidence of faulting between the different lenses, and in some of the stopes are crevices filled with a recently formed manganese wad between walls of carbonate of manganese. In places the better ore is found near the footwall, in others, notable in the south Arschitza lens, a large mass of barren siliceous schist (taub) occurs between the ore body proper and the footwall.

From experiments carried out on the manganese waste, it is clear that the manganese and iron are disseminated throughout the whole ore body, and the segregation to a merchantable ore has only taken place where the fractured character of the rock has facilitated the circulation of meteoric waters. While the iron and manganese ores have segregated to some extent into different masses, the iron ore is not so compact, and appears to be more hydrated than the manganese ore. At the same time the washed ore contains about 10 per cent iron. A piece of mineral with a brownish gray appearance and with the aspect of limestone, taken from one of the lower levels at Arschitza and of the type locally known as rhodonite, when analyzed, proved to consist essentially of rhodochrosite or carbonate of manganese, with some manganese as silicate which dissolved in cold acid with the separation of gelatinous silica. The late O. A. Derby describes a similar mineral, soluble in cold acid, found at the bottom of a quarry at Piquiry in the Queluz district of Minas Geraes, Brazil, from which about 250,000 tons of merchantable manganese ore had been excavated. The Brazilian mineral was examined microscopically, and it was found that it consisted of a carbonate, rhodochrosite, an olivine-like silicate and spessartite. The analyses of these two minerals, which show their remarkable similarity, and also the test of the siliceous schist at Arschitza, are shown in Table I.

Quantity of Mineral Available

By reason of the irregular occurrence of the merchantable mineral in the ore body and the large amount of low grade ore, it had been found in practice that an average of 50 per cent of the poor mineral was left in pillars in the stopes, while of the remainder half was packed in the stopes, leaving only 25 per cent of the total ore body available for the dressing plant. The specific weight of first quality washed ore was found to be 4.20, while that of the manganese waste was 2.81. Deducting the consumption of the deposits necessary to produce the 200,000 tons of mineral already excavated and assuming only 25 per cent of that remaining as merchantable ore, calculations showed that over 150,000 tons of mineral could be mined from the lenses above No. 1 level, a quantity which would guarantee an output of 50,000 tons per annum for three years, while further quantities both of the oxide and carbonate ore would no doubt be proved at lower levels.

As with most mineral deposits the exploitation of the Architza and Teresia properties commenced by open-pit working. The irregular dissemination of the merchantable ore in the siliceous schist made it necessary, however, to remove a large amount of sterile material, and consequently quarrying gave place at no great depth to mining proper at the Arschitza mine. This was carried out for some time by making narrow cross-cuts from the surface to the ore body and extracting the mineral without any pre-arranged plan or regular filling.

Later, the form of overhand stoping in use in 1913 was introduced. Cross-cuts were driven into the mountain side at vertical intervals up to 30 meters, but in practice this distance was found too great, and in several places sub-levels had been made to facilitate the breaking of the ore. Probably owing to the irregular shape of the ore bodies, the main roads along the strike and across them to the footwall were very sinuous, which increased the cost of mining and made transit for men and materials difficult. The ore was extracted by making rooms to a height of 2½ meters from the cross-cuts in the parts of the ore body containing merchantable ore. As the extraction progressed these rooms were filled with the ferruginous low-grade ore found with the merchantable mineral. When the mineral on the level of the drift was extracted, a rise was built through the filling, and another slice of the ore body was taken out. Owing to the irregular occurrence of the merchantable mineral in the ore body, good judgment was required in locating it and determining where the pillars of poor ground should be left. In some places the good mineral was so plentiful that filling was introduced from other parts of the mine.

The mineral was dropped into hoppers in the stopes, which were fitted with doors. Thence it was fed into cars and trammed to the surface. During the day shift the ore was broken by hand drilling, but at night

current was supplied from the central station at Jackobeni which drove two electric percussion drills, and a single stage compressor which operated several jack hammers. The electrically-operated drills were used for main roads and the jack hammers operated in the stopes. At the surface the mineral was discharged into ore piles which were picked over by girls to separate the type known as "stufen," which was sold to glass and chemical works, and a proportion of the better quality of ore, which was disposed of without further treatment.

The peroxide ore amounted to 1 per cent and the raw mineral to 9 per cent of the total output, the remaining 90 per cent going direct to the dressing plant. According to the official figures furnished by the management the average cost of mining the ore for the seven years before 1913 has been 9.4 kronen, or $1.90 per ton, but this figure would no doubt be reduced if the mine were operated on a larger scale. The ore was carried from the mine over light railways to the dressing plant. It was proposed to establish an aerial ropeway for this work, which it is believed, would be more efficient.

Dressing Plant and Cost of Operation

This insfallation was north of the Jackobeni railway station, and near the Bistritz river, from which it took the water for power purposes. The plant was put into operation in 1902. When constructed, it was in three sections but only two of them were in use in 1913, the first being adapted for the small ore, and the second for the lumpy material. In the first section of the plant, all the mineral was passed through chilled rolls which fed into a double trommel with 1 and 8-millimeter openings. The mineral passing through the smaller holes went direct to the settling pits, where it was accumulated as manganese mud. The larger sized ore passed to the boot of an elevator, which took it to a second set of rolls. In the second section, the ore was first passed through a trommel and discharged into a bucket conveyor which elevated it to a point where it joined the rest of the ore. This was afterwards sized in four trommels and trammed to the elevator of the first section of the plant, where it was passed through the second set of chilled rolls, and subsequently sized at that end of the plant. After being sized, the mineral was discharged into trolleys of 800 kilogrammes capacity which were carried by an electrically operated lift to an upper story, where the mineral was distributed to the pockets of the different jigs which were located below.

At the time of the author's visit the river was high and only one-third of the available water was being used, which, although the head was small, was capable of developing a large amount of power. Even in the dry season an ample supply of water was always available. Owing to the rigorous winter the plant was only operated eight months in the year, being shut down from December to March inclusive. The official returns of the plant showed the following average output per day: Sixty wagons of (22 first grade, 38 second grade) of washed ore, 700 kilogrammes each, 42 tons, 35 per cent; 75 wagons of manganese waste, 600 kilogrammes each, 45 tons, 37.5 per cent; 29 wagons of manganese mud, 800 kilogrammes each, 23 tons, 19.2 per cent; and waste to river, 10 tons, 8.3 per cent, total, 120 tons. The average of the different official analyses of the mineral produced at the mine showed in the dry ore with 30.30 per cent manganese and 0.34 per cent phosphorus.

Samples of dried ore taken by the author from the output from the plant analyzed as shown in Table II.

The moisture contained in the different classes of mineral was as follows: Crude ore, 6 to 15 per cent; washed ore, 6 to 7 per cent; manganese waste, 11 to 13 per cent; manganese mud, 11 to 13 per cent. From the particulars of the output of the plant and analyses of the different qualities of ore, it was clear that 37.5 per cent of the total output known as manganese waste contained only 28 per cent manganese, and upwards of 20 per cent silica, compared with the 7 or 8 per cent in the washed ore, and was consequently sold at a low rate. At the time of the author's visit, the erection of a new dressing plant by Humboldt & Co., which would handle 50,000 tons of ore per annum, was under consideration. Further, it was proposed to establish a central station to generate electricity to drive air compressors at the mine as well as the washing plant and electric locomotives. From an examination of the accounts for the years 1906 to 1912 inclusive, the cost of washing the ore appeared to have averaged 1.5 kronen, about 30 cents per ton of run of mine ore.

The cost of the mineral at Jackobeni averaged 12.9 kronen, about $2.61 per ton. The Withkowitz Co., which, with the Kraina Industry Co., made ferro-manganese for the Austrian market, purchased the washed ore and manganese waste, the former on a 46 and the latter on a 28 per cent manganese basis, with a phosphorous penalty in both cases. The Austrian Mining & Ironworks Co. purchased the manganese mud, which it worked up at its Tryznietz plant in a rotary furnace with burnt pyrites and hot-blast stove flue dust. The Albert Hahn Co. took the selected crude ore which was used in the manufacture of basic pig iron. The basis of sale for the mud was 28 and for the raw ore 37 per cent manganese with a phosphorus penalty. Glass works and chemical works utilized the selected ore, that for the former being on a 65, and for the latter on a 70 to 75 per cent manganese peroxide basis. The average amount per ton realized at that time was 10.90 kronen, or about $2.21. The railway rates from Jackobeni to the steel works ranged from 17.4 to 18.8 kronen, or $3.53 to $3.81 per ton. The selling price of manganese ore in 1913 was below the average, so it is estimated that with higher prices and more energetic development of the property it could be made remunerative even in peace times. With the enhanced prices that must obtain in Austria under present conditions, the property would, without doubt, be very remunerative and valuable, but since the occupation of Jackobeni by the Russian troops at the end of June, this source of supply can no longer be available to the central powers.

Contracts for New Buildings

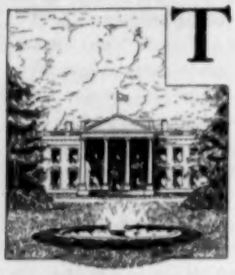
The Peerless Drawn Steel Co., Massillon, O., which built the first unit of its plant eight months ago, has awarded an order for three new buildings to the Austin Co., Cleveland. The trio will be erected at a cost of about $44,000. The buildings are typical brick and steel with saw-tooth roof construction. A trussed roof is used, giving a clear span. The Austin Co. has also taken contracts for two new buildings for the Canton Steel Foundry, Canton, O., maker of steel castings, and for five buildings to be erected for the Aluminum Castings Co., Cleveland. The system of ventilation of the Aluminum company's main foundry is of special interest. The plant will cost approximately $75,000.

R. B. Ohl has been transferred from the general sales department at the mill of the Trumbull Steel Co., Warren, O., to the eastern district sales office of that company in the Grand Central Terminal, New York City.

Business News of Nation's Capital

Important Facts About the Iron and Steel Industry of France —Opening of Bids for Four Battle Cruisers Awaited With Keen Interest

Bureau of *The Iron Trade Review*,
206 Corcoran Bldg.,
Oct. 9, 1916.



THE president of the Comite des Forges (committee of iron manufacturers) of the Loire department of France recently completed a resume relative to the situation in the metallurgical industries during the calendar year 1915. The report has just been received here. The Loire department represents a prominent iron and steel manufacturing province. The iron and steel manufacturers' association is made up of 12 companies.

The president of the association estimates the value of the total output of iron and steel products in the region during 1915 at between 500,000,000 and 550,000,000 francs ($96,000,000 to $106,000,000). The total tonnage production of iron and steel in 1915 showed a notable increase compared with the preceding year, especially in war munitions and supplies, while the manufacture of products for private industries showed a distinct falling off, due to the scarcity of labor and of raw materials. In the absence of statistics of any value, it was found impossible to establish a rational comparison of general results for 1914 and 1915.

The prices of raw materials of all kinds have steadily increased since the outbreak of war, reaching an extremely high point at the end of 1915. The price of coal more than doubled. To avoid shutting down the mills, it was found necessary to import English coal in a proportion of one-third of the total consumption. In December, 1915, English coal cost three times as much as that produced in the local mines. From Dec. 31, 1914, to Dec. 31, 1915, the price of pig iron increased from $19.30 to $46 per metric ton; scrap iron from $17.37 to $38.60 per ton. The prices of metals also advanced in like proportion: Brass from $33.40 to $56.35 per 100 kilograms (220 pounds); lead from $11.17 to $17.37; tin from $79.13 to $96.50, and zinc from $18.33 to $54.04.

During 1915, the workmen's wages were steadily advanced to meet the ever increasing cost of living. Besides, a number of establishments set aside a special war indemnity for the benefit of the workmen having large families. The rise in wages was due, to some extent, also to the fact that Sunday is not considered a holiday since the war, while the working hours are longer. The total number of workmen employed in the iron and steel industries in the region at the end of 1915 was estimated at 50,000. In spite of the recall from the front of a great many of the steel workers and the employment of women wherever possible for special kinds of work, the scarcity of labor during 1915 was a source of constant annoyance and inconvenience to the development of the industrial activities in the region, especially in the production of war munitions which require skilled labor.

The number of metallurgical establishments did not increase, but a considerable number of subsidiary plants were created to meet the great demands which have arisen for factory work connected with the supply of munitions and war materials.

Practically all the steel mills have abandoned for the present the manufacture of railroad materials and rolling stock in order to devote all their energies exclusively to the work for the national defense. To this end, their plants were transformed and equipped to meet the emergency.

Although importations were of considerable volume, foreign competition had no influence on the industries in the department; on the contrary, it was considered as an indispensable balance to the home production.

The prices of all necessaries of life increased considerably during 1915, especially in the large metallurgical centers. It is estimated by competent authorities that ordinary wines, meat, most of the staple food products, and clothing increased from 50 to 70 per cent.

Great Battle Cruisers

Washington, Oct. 9.—Opening of bids on Dec. 6 by the bureau of construction and repair, navy department, for four battle cruisers is being looked forward to with exceptional interest. These craft will be an additional type for the American navy. Their construction will mean a new undertaking for the private ship building yards of the country, for all four contracts are to go to them. Moreover, they will be of a class which is entirely new to the entire world in several respects. They will exceed in length, speed and power those of any cruisers afloat, according to navy department officials.

The cruisers will be 850 feet in length, will have a speed ranging from 32 to 35 knots per hour, and 180,000-horsepower. With armor and armament included, each will cost approximately $20,000,000. By reason of their enormous proportions, these cruisers cannot be built on the ordinary ship building ways required for the construction of a modern dreadnaught. Private plants either have enlarged or are enlarging their ways so that they can construct these cruisers. Some of the private yards, it is understood, would prefer not to bid on these craft, but feel that they owe it to their government to do so and it is expected, therefore, that there will be at least four, if not six, companies that will submit bids for these vessels, each company perhaps offering to build one.

Because these craft will mean a new kind of construction, special provision for awarding the contracts is made in the new naval act. This provision says that, if, in the judgment of the secretary of the navy, the most rapid and economical construction of the battle cruisers can be obtained thereby, he may contract for the construction of any or all of them upon the basis of actual cost, plus a reasonable profit, to be determined by him. Secretary of the Navy Daniels has said that he thinks he will have to resort to the use of this provision. It will involve a novel form of contract. Mr. Daniels, as is known, is obsessed of the idea of "competition" and is understood to have misgivings that this plan will wipe out "competition" in the matter of bids for the cruisers. It evidently was incorporated in the naval act with a view to protecting the ship builder in entering upon an undertaking with which he is not familiar as to the costs it will involve. At the same time, it seems to have been the purpose of congress to give ample protection to the navy department because it gives to the secretary of navy the broad power of determining what shall constitute a

"reasonable profit" for the builder.

These battle cruisers, like the four battleships and some 60 other units constituting the naval building program for the present fiscal year, are to be built with as much expedition as possible. It is understood to be the plan of contractors to use three shifts of eight hours each in building the vessels. Only four of them, according to plans of the department, are to be built in government navy yards. These include a hospital ship, a fuel ship, a gun boat and a torpedo boat destroyer. Bids on all of the vessels, except the battle cruisers, are to be opened on Oct. 25. A bonus of 20 per cent is to be paid for expeditious construction of the vessels authorized.

In addition to the intricate and powerful mechanism required for the four battle cruisers, they will call for approximately 66,000 tons of structural steel. The navy department, as has been pointed out heretofore, has been assured by steel producers that they will supply it and ship builders with material for all of the vessels, giving the government requirements preference over all other customers. The four cruisers will also require about 15,000 tons of armor, 5 inches thick.

Reasonable Bids

Washington, Oct. 9.—Bids for 24 sets of 14-inch and 10 sets of 5-inch forgings for guns for the cruisers were opened last Wednesday by the bureau of ordnance, navy department. The only two producers in the United States of 14-inch guns and forgings, the Bethlehem Steel Co. and the Midvale Steel & Ordnance Co., submitted figures. The Bethlehem company, bidding on all of the 24 sets of forgings of this type, put in a figure of 35¼c per pound. The Midvale company, bidding on 12 sets of this class of forgings, put in a bid of 35c. The Bethlehem company offers to make delivery of one set in 10 months and one set per month thereafter. The Midvale bid provides for the delivery of one set in 240 days and one set every 35 days thereafter. It is assumed that the contract will be equally divided among the two bidders. The bureau will open bids tomorrow for 26 14-inch guns for the cruisers. The forgings are to be finished into guns at the Washington naval gun factory. Each 14-inch gun weighs about 80 tons, while the forgings necessarily have a somewhat heavier tonnage. Each battle cruiser is to carry 10 14-inch guns, and, as the contract will call for 50 forgings and guns of this type, a reserve of 10 will be left.

The Crucible Steel Co. was the lowest bidder on the 10 sets of 5-inch guns, at a figure of 34.35c per pound for nickel steel, and 28.75c per pound for gun steel. Delivery of one set is to be made in 360 days, and two sets per month thereafter. Other bidders on this type of forgings included the Bethlehem and Midvale companies, and the Erie Forge Co. Figures on both the 14-inch and 5-inch forgings are approximately the same as those submitted in 1915 on similar ordnance material. There is doubt as to whether the newly created munition tax will apply on forgings. While the act does not say specifically that they will be subject to the tax of 12½ per cent on net profits of manufacturers, it does provide for a tax on firearms and their appendages. The bids are understood to have been submitted with the understanding that the tax is to be levied, and, in this instance the government itself will have to pay the tax. With this levy considered, it is particularly noticeable that the bids on the 14-inch forgings represent such a slight increase over those of last year as to be insignificant. When it is considered that existing trade conditions are such that manufacturers of ordnance can secure most any price they might ask for material from foreign governments, emphasis is given to the fairness with which they are treating the United States government.

An Invitation to Manufacturers

Ottawa, Ont., Oct. 10. — The Canadian Department of Trade and Commerce, Ottawa, Ont., is sending out extensive invitations to visit the exhibition of over 8,000 samples of German and Austrian manufactured products collected in other countries and secured for exhibition purposes in Canada for a limited period. The samples will be exhibited at Convocation hall, of the Toronto University, Toronto, Ont., from Oct. 23 to Nov. 6. It will be a business man's exhibition, having in view both the extension of the home market and the capture of a portion of the export trade of Germany and Austria. Manufacturers may have the samples examined by expert workmen. The exhibition will not be open to the public, but any manufacturer will be welcomed.

The Sandusky Foundry & Machine Co., of Sandusky, O., has been authorized by the secretary of state to increase the capital stock of the concern from $100,000 to $200,000.

Proving Ground

Will Occupy Large Acreage Bought by Bethlehem Corporation

Trenton, N. J., Oct. 10.—The greatest gun proving plant in the world is to be established at May's Landing, N. J., by the Bethlehem Steel Corporation, primarily for the use of the United States government, greater than the ordnance proving grounds of the Krupp works in Germany. The company has just purchased a tract of land 18 miles long and from three to six miles broad along the Great Egg Harbor river, with May's Landing as headquarters. More than 1,000 deeds were secured in buying the land. In addition to the grounds, the company will build an extension to its plant on the site.

William E. Massey, of Ocean City, N. J., purchased the ground for the corporation. Several hundred acres have also been purchased for the extension of the factory site. Nearly $1,000,000 was spent in acquiring the land and another half million will have to be expended before proving can be begun. The tract is as level as a floor and comprises 20,000 acres. A new railroad will have to be built along the entire grounds. It will be the main proving grounds for the company's various works. Most of the testing of ammunition and armor plate for the United States government will be done there. Representatives from many foreign countries, whose armies and navies use Bethlehem steel products, will be stationed permanently at the place.

While there is some fear of disturbance by the detonations from large guns, the company officials say that any danger of this will be overcome as much as possible. Containing walls will deflect the sound down the untenanted reaches of the river.

The length of the range itself will be 14 miles. A heavy iron fence will be built around the tract and streams running through it closed. The ground could also be used as a military base in case of war. There is talk of digging a ship canal from the proving grounds to the League Island navy yard in Philadelphia.

Will Install New Equipment

Properties of the Wharton Coke Co. at Coral, Indiana county, Pa., consisting of 300 bee-hive coke ovens and 2,500 acres of coal, have been purchased by the Potter Coal & Coke Co., recently organized by S. F. Potter, president; John P. Donohoe, general manager; Edward E. Donohoe, secretary and treasurer, and C. Rae King, general superintendent.

Iron and Money: Fact and Comment

Steel, Munition and Marine Shares Suffer Violent Price Breaks in Wild Session on Stock Exchange as Submarine Topedoes List

ONCE more a German submarine has put a bomb under the market for American securities. The session on the New York stock exchange Monday, when the details of the U-boat's activities off Nantucket were being received, was the most bewildering and excited since 1907. In many respects, the episode resembled the memorable Lusitania affair of May, 1915, except that the list showed some signs of stability toward the close, whereas on the other occasion a condition of hysterical irregularity obtained. When trading started Monday, frantic selling began; in a few minutes, hundreds of thousands of shares were sold for what they would bring. Then the tidal wave of liquidation was stemmed by enormous supporting orders, poured in by banking interests. The steel shares joined the marine and munition stocks in the downward flight, with Republic Iron & Steel leading the decline by a drop of nearly 18 points in a short time. Later it retrieved a large part of this loss. It was the public's fear that the activities of the German submarines might effectually halt exports of munitions that accounted for the major part of the decline in the war brides. Strangely enough, the pool operating in Republic Iron had been making high prices for this stock on the argument that it is but little affected by war orders, its profit being almost entirely from domestic business.

Last Friday also saw a rather severe shake-up in the stock market, but this was the result of a far different influence than that which worked havoc this week, being popularly associated with a recurrence of the mischievous "peace" rumor. The return of Ambassador Gerard was construed as the first step toward Teutonic overtures, although promptly denied at Washington. Earlier in the week, there were slight breaks in stocks which were ascribed to a less confident feeling as to the prospects for a Republican victory in the November election. It is probable that the market was "ripe" for a break as a result of the long drawn out speculation for the rise and that Wall street was straining a point to find a plausible reason. But it wasn't necessary to strain a point last Monday when it was known that the naval war zone had been brought to the front door of the United States.

Quotations on a number of the leading iron and steel and industrial stocks at the close of the New York stock exchange Oct. 7 and net changes for the preceding week are shown in the following table:

	Close Oct. 7.	Net chg.
American Can	63¾	—1½
American Can, prfd.	114⅛	— ⅜
Amer. Car & Fdy.	69⅝	—1⅜
Amer. Car & Fdy., prfd.	119	+1
American Locomotive	80⅝	+ ⅜
Amer. Locomotive, prfd.	106	— ½
American Steel Foundries	61⅛	— ⅛
Baldwin Locomotive	89	+2¼
Baldwin Locomotive, prfd.	108½	+2
Bethlehem Steel	549½	—20
Bethlehem Steel, prfd.	135	+ ⅛
Colorado Fuel & Iron	57¾	—3
Continental Can	103	—1
Crucible Steel	92	—1½
Crucible Steel, prfd.	122	.....
General Electric	180½	—1½
Gulf States Steel	95½	+1½
Gulf States Steel, 2d prfd.	98	+2
Internat'l Harv. of N. J.	116	—1
Inter. Harv. of N. J., prfd.	120	+2
International Harv. Corp.	79	—1
Internat'l Harv. Corp., prfd.	110	+1
Lackawanna Steel	86½	—6½
Nat'l Enamel'g & Stmp. Co.	28½	—1½
Nat'l En. & Stmp. Co., prfd.	96	+ ¼
Pressed Steel Car	66¼	— ¼
Pressed Steel Car, prfd.	104½	.....
Pullman Palace Car	173	—5
Republic Iron & Steel	78⅛	—2⅜
Republic Iron & Steel, prfd.	112¼	+ ⅛
U. S. C. I. P. & Fdy. Co.	23⅞	—1⅝
U. S. C. I. P. & F. Co., prf.	56⅞	+ ⅜
United States Steel	116⅛	—1¼
United States Steel, prfd.	120⅛	—1⅛
Westinghouse Mfg. Co.	64¾	+ ½

Maximum quotations for a number of leading iron and steel securities not listed on the New York stock exchange, as of Oct. 6 and Sept. 29 compare as follows:

	Oct. 6.	Sept. 29.
American Radiator	405	400
American Ship Building	55	50½
Cambria Steel	91	85
Chicago Pneumatic Tool	75	76
LaBelle Iron Works	80½	70
Lake Superior Corp'n	15¾	15⅞
Stewart-Warner Speed. Co.	117	114½
Warwick Iron & Steel	9⅞	9¾
Westinghouse Air Brake	160	154
Westingh'se Elec. & Mfg. Co.	67¼	65¾

Explains Negotiations

The United Steel Co., Canton, O., has issued a statement setting forth its position relative to negotiations pending with eastern interests whereby additional capital may be brought into the company. The statement in full follows:

"A legal notice has been published in the local (Canton) papers, of the calling of a meeting of the stockholders of the United Steel Co., to be held on Oct. 14, 1916, for the purpose of considering the acceptance of a contract looking towards a sale, reorganization and enlargement of the business of the company.

"For some time past eastern capitalists having control of large volumes of business, have desired to become connected with the United Steel Co. for the purpose of enlarging the capacity of the company, with a view of caring for the increased business which they are in a position to offer.

"It is for the purpose of considering the proposed plan offered that the stockholders' meeting is to be held. If accepted, large sums of additional capital will at once be available for the purpose of enlarging the present plant and caring for the expanded business of the company.

"Should this plan be approved by the stockholders, there will be no change in the management except that the eastern capitalists will have representation on the board.

"In substance, the plan proposed is another advancement in the progress of the company, which, if carried through, will afford employment to largely increased numbers of men and indirectly promote the growth and welfare of the city.

"The directors feel that the proposed sale offers a splendid opportunity to the stockholders, and will make for a bigger and better Canton.

"Further details cannot be announced until after the stockholders' meeting."

President H. R. Jones explains that the pending plan "simply means that if the stockholders approve, additional capital will be brought into the company, its operations increased and additions made."

American Interests Land Chinese Contract

The American International Corporation and the Siems-Carey Railway & Canal Co. have signed a contract with China to build 1,100 miles of Chinese government railways. The construction of these lines will be financed by Chinese government bonds issued through the American International. The lines are to be located by an American engineer appointed by China on the recommendation of the American company. The cost of construction may run as high as $100,000,000. In selecting the location of the lines care will be taken to avoid conflicts with agreements for railroad construction between China and any other powers. An advance of $500,000 has already been made to China for preliminary investigation expenses. The contract provides that the chief engineer who shall select the lines will later act as chief engineer for the railways, and an American auditor and traffic manager also will be appointed. The Siems-Carey

Railway & Canal Co. was organized by the American International Corporation and Siems & Carey, St. Paul, Minn.

J. Frater Taylor Named President

J. Frater Taylor again was elected president of the Lake Superior Corporation at the annual meeting in Philadelphia, succeeding W. E. Slavert, who now is in Europe. Mr. Taylor formerly served as president but recently has been acting as vice president. The other officers elected were: Vice presidents, Herbert Coppell, W. C. Franz and Jas. Hawson; chairman, Walter K. Wigham. The directors chosen were: Walter K. Wigham, J. F. Taylor, Herbert Coppell, Jos. F. Dale, Jas. Hawson, Thos. Gibson, Alexander Taylor, Harvey I. Underhill, W. C. Franz, A. H. Chitty and Wilfred H. Cunningham. Mr. Taylor, in his address to the stockholders, warned them not to be carried away by the "false" prosperity of the present day. He intimated an early reorganization of the corporation. "My opinion," he said, "is that a reorganization of the Lake Superior Corporation possibly by a reduction of the capital stock, may be desirable sooner or later." It is necessary, he said, to put the Algoma Steel Co. on a complete and substantial basis so that it will be able to make varied products.

Charcoal Iron to Pay First Dividend

The Charcoal Iron Co. of America has declared an initial dividend of 3 per cent on the preferred stock, payable in three installments of 1 per cent each, Nov. 1, Dec. 1 and Jan. 1, to stockholders of record Oct. 15, Nov. 15 and Dec. 15, respectively. Action was taken at a meeting of directors held in the general offices of the company in Detroit. It was announced that additional dividends on the preferred will be paid at monthly intervals until the full amount of back dividends on the issue has been distributed, probably by April 1. Back dividends had accumulated since July 1, 1915. During the next six months preferred stockholders likely will receive 10½ per cent on the par value of their stock, which is $10. Preferred stock outstanding amounts to $5,217,250.

The entire output of charcoal pig iron for 1916, it is stated, is sold and also a large proportion of the company's capacity for 1917. The Charcoal Iron Co. is a large producer of acetate and of lime and wood alcohol, as well as pig iron. It has six plants in Michigan and Wisconsin and large timber land holdings. Common stock outstanding amounts to $2,839,350. A statement issued for the quarter ended June 30 showed net earnings of $350,000. This was equivalent to a rate of 38 per cent on the common after allowing for regular preferred dividends.

Midvale Steel Profits Large

Stockholders of the Midvale Steel & Ordnance Co., at their annual meeting in this city today, heard from Chairman Wm. E. Corey that the earnings of the corporation since last February had been running at the rate of $30,000,000 per year. Mr. Corey stated that aside from the returns of the Remington Arms Co., monthly earnings were in excess of $2,500,000. These earnings included those of the Cambria Steel Co., which was purchased last February. The stockholders were advised that by Jan. 1, 1917, the company's daily production would be increased by 1,000 tons of pig iron and 1,200 tons of open-hearth steel.

Financial Crop Ends

The Tiger Drill Co., Beaver Dam, Wis., which succeeded the J. S. Rowell Co., maker of farm implements, has disposed of its plant and business to the Harris Bros. Co., Chicago, which intends to resume operating the plant at an early date.

* * *

The A. J. Kirstin Co., Escanaba, Mich., manufacturer of stump pullers, has purchased the Zimmerman Steel Co., Bettendorf, Ia., which also produces the same kind of machines. This is the fourth company acquired by the A. J. Kirstin Co., within recent years.

* * *

The Poole Machine & Engineering Co., Baltimore, has bought control of the Motsinger Device & Mfg. Co., Lafayette, Ind. T. E. Laky, secretary and treasurer of the Baltimore company, has taken charge of the Lafayette plant. The Poole company last April awarded a contract to the Motsinger plant for the manufacture of 1,000,000 1-pound shells.

* * *

The Pullman Co., Chicago, reports net income of $13,556,091 for the year ended June 30, a gain of $2,312,123 over the previous year's results. This was shown in a report filed with the public service commission of Massachusetts. The earnings were equal to 11.35 per cent on the $120,000,000 stock outstanding. The balance carried over to surplus is $3,464,918, against $1,749,991 the previous year.

* * *

The American Rolling Mill Co., Middletown, O., plans extensive increases to its capacity. A new turbo-generator will be installed in its power plant at its east side works. A soaking pit will be added to the four at this works and two open hearth furnaces erected, bringing the total furnaces to six at this works and four at the central works. Sixteen years ago the American Rolling Mill Co. began operating in Middletown with one 25-ton open hearth.

* * *

W. E. Woodard, of Schenectady, N. Y., has become vice president of the Lima Locomotive Corporation, and W. M. Myers, former manager, was promoted to the position of assistant to the president, an office just created. O. J. Smith, of New York City, for 16 years connected with the American Locomotive Co., is the new manager. Mr. Woodard has been assistant chief engineer of the American Locomotive Works.

* * *

The Burnside Steel Co., Chicago, has been incorporated with $100,000 capital stock and has bought a site at Kimbark avenue and Ninety-second street, where erection of a plant has been begun. The structure will be of steel, 80 x 200 feet, with an office and pattern storage building 30 x 50 feet. A Tropenas side blow converter will be installed and the product will be steel castings. The foundry will be open for a jobbing business and will not specialize at first until a definite field is found. H. F. Wardell is president. George L. Pollock, vice president and treasurer and C. S. Daniels, secretary. Officers are at 548 Railway Exchange building, 80 East Jackson boulevard.

* * *

The Sloss-Sheffield Steel & Iron Co., Birmingham, Ala., reports net profits for the quarter ended Aug. 31, of $481,466 (partly estimated). After bond interest,taxes, depreciation and dividends on preferred stock, the balance is $304,425, equivalent to $3.04 on the common stock or at the annual rate of $12.16 a share. For the nine months ended Aug. 31 net earnings for stock were $1,407,506, the balance after preferred dividends being $1,055,766, or at the annual rate of $14.08 per share. Third quarter earnings were reduced considerably by the inability of the railroads to accept offered shipments of iron, earnings not being calculated until the iron is actually shipped.

* * *

Colonel Cantley, president of the Nova Scotia Steel & Coal Co., New Glascow, N. S., says that his company is turning out steel billets at the rate of 15,000 tons a month, as compared with less than half that amount a year ago. For the current calendar year he estimates the total output for the Dominion of Canada at 1,500,000 tons, as compared with a previous high record of 1,350,000 tons in 1913. Last year the output was 975,000 tons. Despite the larger output Colonel Cantley is of the opinion that the steel famine in Canada will continue for the rest of the year and there will be no relief after the turn of the year after making due allowance for the new plant that is being put down.

News of Employers and Employes

British Savants Shocked by a Shipbuilder—Coddling Which Diverts Attention From Real Evils—Agitator Still Agitates at Milwaukee

Bureau of *The Iron Trade Review*,
Prince's Chambers, Corporation St.,
Birmingham, Eng., Sept. 30.

THE savants who discussed "Fatigue from the Economic Standpoint" at the recent meeting of the British Association, experienced a little shock by the intervention in the debate of a practical ship builder, who brought the discussion from the lofty heights of science and theory to the daily level of work-a-day practice. This contribution from experience was the feature of the discussion.

Dr. Hunter (Swan, Hunter & Richardson, Wallsend) was, he said, prepared to agree that the question of fatigue or over fatigue had some importance, and that it was worthy of investigation, but its importance had been exaggerated. He had no reason to think it of very great importance in connection with his ship building. His statistics showed that accidents were more numerous during the first than the latter half of the day. On Mondays after the Saturday and Sunday rest there were more accidents than on any other day of the week. (Laughter.) Moreover, his firm's men were more tired on Monday morning, and less willing to work than on any other day in the week. (Laughter.) He thought they might find something more important to investigate than this overfatigue. If men combined hard work with drinking whiskey, then overfatigue might and did come in. Men who did not take drink worked longer hours in their works, and did not suffer in health or complain of overfatigue. It was the men who took drink—he did not mean the drunkards, but men who took a certain amount to drink—who found that they were not able to work long hours and who complained of overfatigue, and who did not come in on Monday, and sometimes not on Tuesday. (Laughter.) Some said the percentage of sickness was increasing. There was a simple explanation. In the old days, men could not afford to lose time, because they lost all their wages; now they got paid when they lost time, and were not anxious to return to work. In time of strikes the health of the workers improved. The reason was the same—they had not the money to spend in drink. In the ship yards, the question of overfatigue was not of such importance that it could not be dealt with by the men themselves without legislation. Men of the past generations worked much harder than those of the present. If men took a more intelligent interest in their work and worked harder, they would feel very much less fatigue (Laughter); the effort to work slowly was really very fatiguing. (Laughter.) As a matter of fact, there was a great deal of "coddling" going on, and it diverted attention from real evils. There was a certain amount of sweating, for instance, but not in Newcastle. There was great suffering through poverty and sickness. People should pay attention to these evils, and cease "coddling" and trying to invent subjects for investigation. Then there was also slacking, but workmen were no more subject to it than other classes.

Request and Protests

Application has been made to the New York State Industrial Commission by the Lackawanna Steel Co. for authority to exempt its employes from the provisions of the state law which requires that one day's rest in seven will be granted in any establishment when the men work more than eight hours in 24. President E. A. S. Clarke of the company is quoted as saying that his company did not wish to violate the spirit of the law, but that it had been found that the statute was inconvenient to operations as at present enforced. Some of the welfare organizations and social workers have raised protests against any exemption being granted the company by the state authorities.

Gained Nothing

Milwaukee, Wis., Oct. 9.—Leaders of the late and unsuccessful machinists' strike at Milwaukee will not yet admit defeat, although to all intents and purposes the strike is over and the men have gained nothing. Emmet L. Adams, who was imported to organize the machinists a year ago, and who was the leader of the strike, which started July 18, has issued a statement, saying in part:

"For ourselves, we are content with the developments of the strike situation to date. In those shops where we have reached an understanding with the management and it is lived up to gracefully, we shall undertake to give our best service. But the backfiring of any employer only means that he is storing up trouble that will engulf him in the future."

Adams would have it appear that the strike resulted in a reduction of the weekly working schedule from 55 to 52½ hours, but the employers voluntarily instituted the 52½-hour week on July 1, and the strike, starting July 18, was to enforce the demand for an eight-hour day.

Employers Organize

The employers' association of Berkshire county has been organized in Pittsfield, Mass., with the "open shop" as its slogan, the promotors of which say that "the employers in getting together are simply keeping step with the forward movement which is characteristic of all great industrial centers in the United States." A free labor employment bureau will be established open to union and independent workers. The officers are: James H. Wilson, president; Arthur W. Eaton, vice president; Henry E. Russell, treasurer; Charles H. Wilson, Arthur H. Rice, Henry A. Francis, Cummings C. Chesney, E. Archie Jones and D. Herbert Pike, managers. They are textile, paper, electrical, machinery and building manufacturers.

Labor Notes

Hon. Robert Rogers, acting premier of Canada, recently received a deputation of the Trades and Labor Council, who urged the government control of munition manufacturing plants. In reply, Mr. Rogers stated that it was too late for such action, as the British government had intimated that all shells required were now made or in course of manufacture and that it was doubtful whether any more British contracts would be let in Canada, though some might be awarded by Russia.

The Westinghouse Air Brake Co. Veteran Employes' Association held its fifteenth annual reunion in the Y. M. C. A. at Wilderming, Pa., Oct. 5. H. H. Westinghouse, John F. Miller and A. L. Humphrey, president, vice president and general manager, respectively, of the Air Brake company, and E. M. Herr, president of the Westinghouse Electric & Mfg. Co., were among the speakers.

Will Make Wire Products

Trenton, N. J., Oct. 9.—The John A. Roebling's Sons Co. has leased the entire five-story and basement warehouse building at 223-227 Arch street, Philadelphia, for a period of 10 years. The building will be used jointly by the Roebling company and the New Jersey Wire Cloth Co., a subsidiary corporation, for the manufacture of certain lines of their products and for storage and general offices. Extensive improvements and alterations will be made to the building. The company will take possession on Jan. 1, next.

McKinley Dollars

The souvenir gold dollar, specially minted by the United States treasury department in connection with the new McKinley birthplace memorial now in course of erection at Niles, O., where the martyred president was born, is now ready for distribution. The new dollar has on one side a likeness of McKinley and on the other a bas relief of the magnificent memorial building. These coins, of which no more will be minted, are certain to be highly prized by collectors. They will be sold at $3 each, and may be obtained from the leading banks in the principal cities, or from the McKinley Birthplace Memorial Association, Youngstown, O.

Death of Colonel R. C. McKinney

Col. Robert Cochran McKinney, one of the foremost figures in the American machine tool industry, died at his home at Belle Haven, Conn., Oct. 3, from a physical breakdown following three years of ill health. Colonel McKinney was president of the Niles-Bement-Pond Co. from the time of its organization in 1898, until February, 1915, and since then until his death he served as chairman of the board of directors. He combined mechanical genius with rare talents for business organization, and the huge business which he was instrumental in founding owes much of its prosperity and prestige to him.

Colonel McKinney was born in Troy, N. Y., 64 years ago, and while a youth moved to Cincinnati with his parents. He took a partial course in mechanical engineering at Cornell university, following which he obtained employment with a steam pump company at Hamilton, O. In 1877 he became associated with the Niles Tool Works, Hamilton, the first machine tool concern to be located west of Philadelphia. Within two years he was elected secretary of the company and a little later treasurer and general manager. His management was attended by a rapid and healthy expansion on the part of the company. In 1898, the first steps in the formation of the Niles-Bement-Pond Co. were taken by the purchase of the Pond Machine Tool Co., Philadelphia, and also, shortly after, of Bement, Niles & Co., and the Philadelphia Engineering Works, Philadelphia. Concerns which were purchased following the organization of the Niles-Bement-Pond Co. included the Pratt & Whitney Co., Hartford Conn.; the Bertram Co., Canada, and the Ridgway Machine Co., Ridgeway, Pa.

Colonel McKinney was president of the Machinery Club of New York, a member of the American Society of

ROBERT C. McKINNEY

Mechanical Engineers, a member of the Union League, Lotos, Engineers' and Cornell clubs, New York, the Hartford club, Hartford, and the Queen City club, Cincinnati. His title of colonel was gained by his service on the staff of Governor Bushnell of Ohio.

Explosion Causes Fire

The Toledo Metal Wheel Co.'s plant, Toledo, O., suffered an $11,500 fire damage, Oct. 2, when fire started in the enameling room as the result of an explosion. William Valade, foreman of the enameling room, is in St. Vincent's hospital as the result of burns suffered through the explosion and fire. Several departments are closed as a result and cannot be reopened for several weeks.

Contract Toluol

Is Settling to Lower Level—Spot Benzol is Strong.

New York, Oct. 10.—Contract toluol after the recent period of indefinite prices, now appears to be reaching its true level and is quoted at from $2.25 to $2.50 per gallon. A fair amount of business was done at these prices durin the past week. There are reports that larger orders are in sight, but nothing assured has developed in that direction. For spot delivery, toluol is selling at from $3 to $3.50 per gallon, most of the business going near the minimum figure. Production of toluol and other leading by-products is constantly increasing and several new plants are scheduled to come in during the next few months. This may be responsible for the easier condition of prices that is shown not only in toluol but in certain other products. Spot benzol shows some exception to this statement and appears stronger at least sentimentally. Considerable buying was done this week at from 60 to 65 cents per gallon and there is talk of 70 cents again, but that price has not been realized. Contract benzol is quoted at 60 cents, but there is more or less shading. There is continuing good buying of phenol for spot shipment at from 55 to 60 cents per pound. Some large sellers have pretty well exhausted their offerings for early delivery. Neither the sellers nor the buyers are interested in contracts for phenol and this market is nominal at 60 cents per pound. Weakness still prevails in solvent naphtha, though the volume of sales is larger. Spot is from 30 to 35 cents per gallon and contract at 30 cents and both positions are being shaded.

Further advances are being scored by sulphate of ammonia, which now is quoted at from $3.77 to $3.80 per 100 pounds at tidewater. A number of supplementary contracts are being placed by fertilizer manufacturers for delivery during the next four or five months. The free supply is limited.

Market Prices for Coke Oven By-Products

Spot.

Per Gallon at Producers Plant.	
Pure benzol	$0.60 to .65
Toluol	3.00 to 3.50
Solvent naphtha	.30 to .35
Per Pound at Producers Plant.	
Phenol	$0.55 to .60
Per 100 Pounds at Seaboard.	
Sulphate of ammonia	$3.77 to 3.80

Contract.

Per Gallon at Producers Plant.	
Pure benzol	$0.60
Toluol	2.25 to 2.50
Solvent naphtha	.30
Per Pound at Producers Plant.	
Phenol (nominal)	$0.60
Per 100 Pounds at Seaboard.	
Sulphate of ammonia (nearby)	$3.77 to 3.80

Preparedness Plans Enliven Market

Equipment for the Manufacture of Heavy Guns May Be Purchased Freely—Ship Building Companies Contribute to Week's Business—Good Lists Appear in Pittsburgh Territory—Plant Additions Being Made in Cincinnati

HUGE orders for machine tools are in prospect as a result of the naval construction program which was adopted just before the adjournment of congress. Due to the magnitude of the schedule, a great deal of the construction work is to be done by private concerns and bids on a number of large contracts already have been received by the government. It is believed that the leading ordnance building companies will be awarded large contracts for heavy guns and it is expected that equipment orders, involving at least $1,500,000 will be placed. A heavy inquiry for special machinery also is expected to develop from government arsenals. A demand of large proportions also is beginning to materialize from ship builders, particularly those on the Atlantic coast. These concerns are expected to secure large contracts before long for the construction of naval vessels in connection with the new schedule. Among the ship builders which have been large buyers of machine tools of late are the Sun Ship Building Co., Chester, Pa., and the Samuel L. Moore & Sons Corporation, Elizabeth, N. J. Another large eastern ship builder has put out preliminary inquiries for several hundred thousand dollars worth of machine tools which, it is believed, will be closed as soon as an appropriation, to be based on the bids, is authorized.

The American Bridge Co. has been a heavy buyer lately of bridge shop equipment. The Baltimore & Ohio railroad, in accordance with its policy of entering the market each month for portions of its machine tool requirements, has placed some further orders. The Lehigh Valley railroad has taken bids on a large list, but nothing yet has been heard as to when the business will be distributed. A large number of railroads throughout the country of late have inquired on good-sized miscellaneous lots of tools, which involve an outlay of several hundred thousand dollars. There does not seem to be much inclination to close, however. A good volume of small orders continues to come out from domestic concerns generally. The Simplex Automobile Co., New Brunswick, N. J., is in the market for one shaper and two tool room lathes. The Newark, N. J., board of education has taken bids on one lathe and two universal grinders and early awards are expected. The demand for large lathes for export has improved and numerous orders, involving from one to 10 machines are reported. Inquiry for cranes is active, but the high prices due to the sold-up condition of the market continue to restrict business.

The New Departure Co. has awarded the contract for a two-story addition to its plant at Elmwood, Conn. The Western Maryland railroad is reported to be planning the erection of a $300,000 repair shop at Cumberland, Md. The Acme Pattern & Machine Co., Buffalo, has started work on a $100,000 plant. The Simplex Time Recorder Co., Gardner, Mass., will build a $30,000 addition. Walker & Davis, Philadelphia, machinists, will erect a plant. The Improved Machinery Co., Nashua, N. H., plans to erect a three-story machine shop. The Bridgeport Brass Co., Bridgeport, Conn., has awarded the contract for a casting shop. The Standard Guano Co. will erect a $100,000 acid plant at Baltimore. The Samuel L. Moore & Sons Corporation, Elizabeth, N. J., will build a new power house and carpenter shop.

Buying Movement in Chicago

A NEW domestic buying movement seems to be in progress in the Chicago market. Buyers, representatives of diversified industries, have been active and when sales have been made, contracts call for delivery about the first of the year. A large part of the week's business was composed of orders for single tools and in lots of two and three machines. No large individual lists have appeared. A few cases of cancellation of orders have been noted, but buyers are readily found when equipment may be had for immediate shipment.

Market Active in Pittsburgh

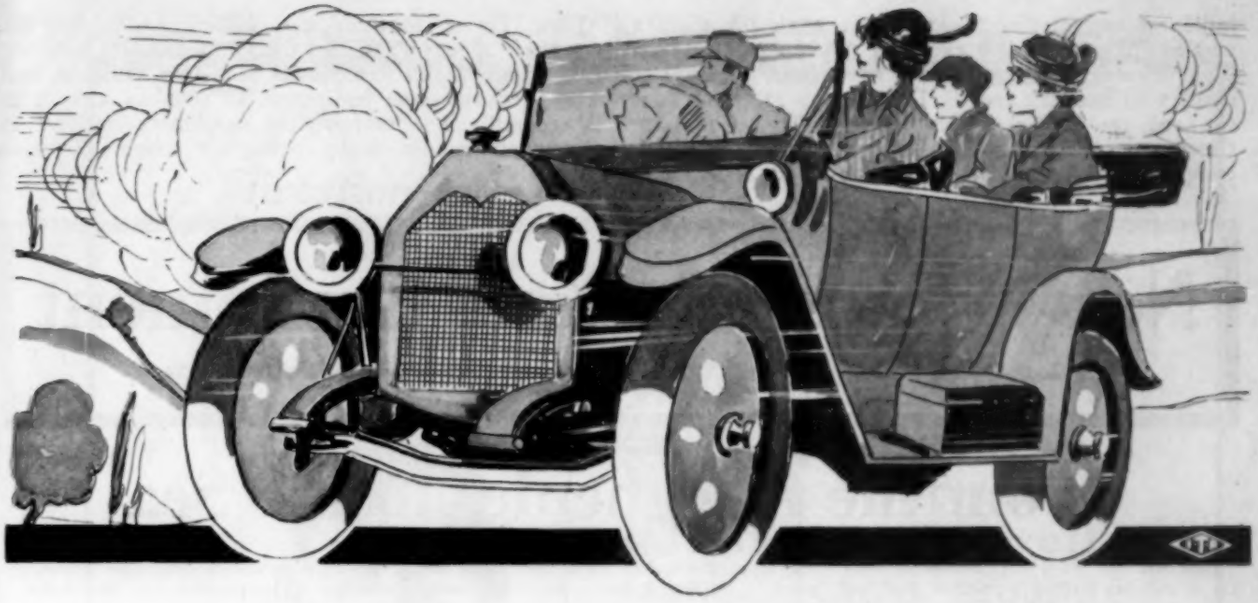
DOMESTIC buying of machinery is broadening in the Pittsburgh district. The Westinghouse Machine Co., East Pittsburgh, Pa., has sent out inquiries for 36 tools, including planing, boring and milling machines, radial drills, lathes and a large forging press, the details of which appear elsewhere in this issue. The Matthews Gravity Carrier Co., Ellwood City, Pa., has been buying considerable equipment, including blacksmith forges, bending rolls, screw machines, drawing presses, milling machines and grinding equipment. Dealers have received a number of inquiries for tools for export, but purely domestic demand exceeds that for foreign shipment by a wide margin. The Mesta Machine Co., Mesta, Pa., is increasing its capacity in an effort to meet demand for heavy rolling mill equipment and several other manufacturers of heavy machinery are making additions to their plants.

Small Orders Feature Cleveland Market

SALES of machine tools in lots of one to three tools have characterized the Cleveland market for several weeks. While the volume of business concluded last week was good, there continues to be no large orders. Power hack saws, air compressors, drilling machines, milling machines and planers seem to be most in demand. The 10 per cent increase on lathes, which was mentioned last week in *The Iron Trade Review* as pending, has not been officially announced, but the rumor that this increase may be expected within the next 10 days continues to be heard. The Dann Spring Insert Co., Cleveland, is erecting a plant and will be in the market for general equipment. Victor Sincere, superintendent of the Bailey Co., Cleveland, is interested. The Fulton Tool Works, Canal Fulton, O., will move to Huntington, W. Va. It is understood that this concern will be in the market for some additional equipment after the change in location is made.

Building Active in Cincinnati

MACHINE tool plants in Cincinnati and vicinity continue to add to their manufacturing capacities. The Cincinnati Planer Co., which has erected two



Safety First

There's a great difference in the pleasure of riding in an automobile with a reputation of being **non-breakable,** and riding in one likely to break down under unusual stresses.

That is why automobile and motor truck builders use special care in selecting the materials they put into their products.

Axles, crank and drive shafts, connecting rods and all other parts of automobiles and auto trucks made of "AGATHON" STEELS have proved their exceptional adaptability for such purposes.

Protect your reputation and the reputation of your car

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"AGATHON" Nickel Steels
"AGATHON" Vanadium
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AGATHON STEELS

THE CENTRAL STEEL COMPANY

MASSILLON, OHIO

Detroit Office: 326-27-28 Ford Bldg., F. Walter Guibert, District Representative
Cleveland Office: Hickox Bldg., The Hamill-Hickox Co., District Representative
Chicago Office: Room 1511-12 Lytton Bldg., 14 East Jackson Blvd., A. Schaeffer, District Representative
Philadelphia Office: 902 Widener Bldg., Frank Wallace, District Representative

buildings recently, will soon begin work on another addition to cost $15,000 exclusive of equipment. Two 4-ton electric cranes will be needed as well as a number of machine tools. The Carlton Machine Tool Co. and the United States Machine Tool Co., both Cincinnati concerns, will build new plants, for which complete equipment will be purchased at once. The Wood Turret Machine Co., Brazil, Ind., will also construct a new plant, and the Ohio Mold & Foundry Co., Cincinnati, is looking for a factory building, and will purchase some equipment as soon as a location is secured. The majority of machinery builders in Cincinnati cannot make deliveries within 30 days after date of sale.

New Construction and Equipment

What it is **Where it is** **Who's doing it**

From the Alleghenies to the Sea

ELMIRA, N. Y. — The Eclipse Machine Co. is receiving bids on a machine shop and tool room addition, 2-stories high, 40 x 72 feet and 40 x 100 feet. E. J. Dunn is president of the company.

FULTON, N. Y.—The Arrow Head Mills Co. plans alterations costing $4,000, to its mill.

HAMBURG, N. Y.—A $20,000, 2-story planing mill, 50 x 100 feet, will be erected by the Hamburg Planing Mill Co., Lansing, Bley & Lyman are the architects.

NIAGARA FALLS, N. Y.—The National Carbon Co., Cleveland, has plans about completed for a $50,000 plant here. The Osborn Engineering Co., Cleveland, is architect and engineer.

NORTH TONAWANDA, N. Y.—The Herschell-Spillman Co. will erect a $65,000 addition to its plant here. The building will be 3-story, 65 x 160 feet.

TROY, N. Y.—The Troy Engine & Machine Co. has plans in progress for a $50,000 foundry, 1 and 2-stories high. Fletcher & Thompson, Bridgeport, Conn., are the engineers.

BELLEVILLE, N. J.—The Kent Motors Corporation, Frederick H. Clarke, president, will shortly begin work on a new plant here to be of steel and concrete, 1-story, and costing about $1,000,000. Plans have been prepared by Marvin & Davis, 303 Fifth avenue, New York.

EAST ORANGE, N. J.—Electric Rectifier Co. has been incorporated to manufacture electrical apparatus with $100,000 capital by Robert A. Bachman, James M. Clark, James K. Elderkin Jr., Daniel T. Dubyns, East Orange.

PATTERSON, N. J.—Thomas & Kelley Co. plans the erection of a 4-story, 60 x 150-foot mill. Wm. F. Fanning is the architect.

PATERSON, N. J.—The Standard Oil Co. will erect a new plant in West Railway avenue. The group of buildings will cost about $100,000 and will consist of warehouse, 75 x 100; stable, 30 x 100; garage, 30 x 80; machine and repair shop, 20 x 25; office building, 30 x 75; and tank building. Contract has been awarded to H. D. Best Co., New York. Contract for gasoline and oil tanks awarded to Eagle Tank Co., Bayonne.

ARCADIA, PA.—The International Coupler Co. has plans for a $10,000, 1-story plant, 50 x 175 feet. Ralph Dorath, Pittsburgh, is engineer.

NEW CASTLE, PA. — The Pennsylvania Engineering Works will soon start the erection of a foundry addition, 100 x 280 feet. The steel tonnage is 250. The Sharon Dismantling & Construction Co. has charge of the construction.

PHILADELPHIA.—The Contract has been awarded for the erection of a mill for the Specialty Silk Co. It is understood the plant, including equipment, will cost $100,000.

PHILADELPHIA.—The plant of the American Press Cloth Co. at Columbia, S. C., has been purchased by the F. T. Parker Co., of this city, which will increase its equipment considerably.

READING, PA.—The Terre Haute Money Machine Co., Terre Haute, Ind., has started work on the erection of a $70,000, 1-story plant here. W. S. Barstow & Co., 50 Pine street, New York, are the engineers and builders.

NEWARK, DEL. — The American Fibre Co., Wilmington, will start work shortly on a $6,000, 1-story plant addition, 60 x 100 feet. Roscoe C. Tindell, Wilmington, is the architect.

WASHINGTON.—The Bureau of supplies and accounts, navy department, has sent out a list of machine tools and equipment which includes traveling cranes, jib cranes, hoisting engines, spot welder, wood working machines and miscellaneous machine tools.

Activities in the Central States

AKRON, O.—The Firestone Tire & Rubber Co. plans to erect a new power house and several factory buildings on a site recently purchased.

AKRON, O.—The Miller Rubber Co. has taken out a permit to erect a new, $300,000 factory building, 8 stories, of brick and steel construction.

AKRON, O.—The Akron Steel Co. has been incorporated with $60,000 capital by V. M. Herrick and C. A. Spencer to make steel castings. A plant will be built in the near future.

CANTON, O. — County engineer J. L. Sickafoose will prepare plans for a 90-foot steel and concrete traffic bridge at Wabash avenue in Wooster.

CANTON, O.—The Canton Steel Foundry Co. will install two 15-ton electric overhead cranes and one 35-ton electric overhead crane in the new additions which are now being completed. The new buildings include a molding room, a core department a casting room and an open-hearth department.

CINCINNATI.—The Fischer Special Mfg. Co., makers of screw machine products, has let contracts for an addition to its plant at 2076 Reading road.

CINCINNATI.—The Hirsch Iron & Steel Co., St. Louis, will establish a branch plant in this city as soon as plans can be formulated. The company is at present looking for a site on Walnut Hills.

CLEVELAND.—The Peerless Motor Car Co. has taken out building permits for two new plant additions costing $130,000.

CLEVELAND.—Armour & Co. have taken options on land on which to build a $100,000 storage and distribution station.

CLEVELAND.—The Hudson-Styvesant Motor Co. is preparing to erect a 5-story, 63 x 199-foot, fireproof service station at 1937 Prospect avenue to cost about $85,000.

CLEVELAND.—The Cleveland Clutch Co. has been incorporated with $10,000 capital by C. A. McMorris, Harold T. Clark, C. C. Owens, Ernest Angell and Sterling Newall.

CLEVELAND.—The Ackerman Wheel Co. has decided to locate in Cleveland and will close on a temporary plant building shortly. A new plant will be built early in the spring.

CLEVELAND.—The Cleveland Cadillac Co. has taken out a permit to erect a $100,000 automobile service station at East Chester avenue and East Thirtieth street.

CLEVELAND.—The National Acme Mfg. Co. has 15 acres on East 131st street near St. Clair avenue, which will be improved with new factory buildings costing approximately $300,000.

CLEVELAND.—The Chandler Motor Car Co. has started work on a 4-story, 60 x 500-foot general assembly building. A 3-story addition will be made to its service building. Further construction is planned for the spring.

CLEVELAND.—The McIntyre & Wilson

Flirtation Talks with

ROLLING MILL JIM

Well, fellows, I got caught flirtin' a coupla' weeks ago. A real nice salesman from a roll foundry came around and took me out to dinner. About midnight after we had had quite a few, he asked me for a trial order and me, [feelin' pretty lively] gave him a set of bloomers. They were only in the mill a few days before they broke, and I had to put Hubbards back in the mill. Believe me, I'll never go out to dinner again.

So long—

Rolling Mill Jim.

Hubbard Steel Foundry Co.

EAST CHICAGO, IND.

All Kinds of Iron and Steel Rolls and Steel Castings.

Co. has been incorporated with $10,000 capital, to manufacture surgical appliances, by C. T. McConnell, Frank K. Pickering, C. A. Hoffman and G. T. McConnell.

MARION, O.—The Interstate Iron & Steel Co. plans to enlarge its present plant. A building will be erected to accommodate a 9-inch finishing mill.

MASSILLON, O. — The Peerless Drawn Steel Co., Cleveland, will erect three additional buildings at its Massillon plant. The buildings will be steel and brick construction, saw-tooth type, 49 x 326 feet, 40 x 120 feet and 44 x 150 feet, respectively.

FINDLAY, O.—The Findlay Carriage Co.'s plant, which suffered $500,000 fire damage, will be rebuilt.

MIDDLETOWN, O.—The American Rolling Mill Co. will make extensive improvements which include a turbo generator, a new soaking pit and two 75-ton open-hearth furnaces.

NEW PHILADELPHIA, O.—The Dover Mfg. Co. will rebuild at once the structures recently destroyed by fire at a damage of $125,000.

NORWOOD, O.—The Pfau Mfg. Co. will build the following additions to its plant: A power house 60 x 350 feet; a connecting building 50 x 60 feet, and plumbing pottery building, 40 x 240 feet. Total cost, $175,000 Plans are being prepared.

SPRINGFIELD, O. — Beckley & Meyers Ice & Fuel Co., A. J. Beckley, manager, will erect a 1-story, 50 x 80-foot ice storage plant.

STEUBENVILLE, O.—It is reported that the Pennsylvania railroad will erect car shops on the land which it recently purchased in the locality of Steubenville.

TIFFIN, O.—A new boiler house and heating plant will be installed in the county infirmary at a cost of about $10,000.

TOLEDO, O.—The Toledo Ship Building Co. will erect a $14,000, 4-story pattern storage building adjoining its plant on Front street.

TOLEDO, O.—The Electric Converter Co. has been incorporated with $50,000 capital by M. L. Groves, S. R. Groves, M. C. Delaney, A. S. Hickok and William Grob.

TOLEDO, O.—The Clark Machine Gun Co. has been incorporated with $50,000 capital by Arthur A. Swartz, John H. Wilson, Alvaro D. Clark and James E. Cobb.

URBANA, O.—The Central Glass Co. has been incorporated with $100,000 capital by G. H. Adams, Harry C. Ream, et. al.

YOUNGSTOWN, O. — The Youngstown Towel & Supply Co. will erect a 2-story and basement, 35 x 130-foot laundry building. The building will cost $25,000 and will be of brick construction. Stanley & Schieble are the architects.

YOUNGSTOWN, O.—W. C. Owen & Co., 1900 Euclid avenue, Cleveland, have plans for the new Willis hotel, Youngstown. The building will be 12-story, 72 x 95 feet, of brick, steel and reinforced concrete construction. Randal Montgomery, Youngstown, is president of the company.

WEIRTON, W. VA.—The Phillips Sheet & Tin Plate Co., J. Edward Collins, general manager, will erect a $2,000 addition to the sheet mill at Weirton, W. Va.

CROWN POINT, IND.—The Letz Mfg. Co. will build a 2-story addition costing $15,000 for the manufacture of feed grinders.

INDIANAPOLIS.—The Indianapolis Water Co. is preparing to spend $225,000 for improvements and $180,000 in bonds will be issued. C. L. Kirk is president.

INDIANAPOLIS. — The American Metal Furniture Co. has been incorporated with $10,000 capital. Directors are: J. A. Miner, Stanley C. Brooks, and Edward J. Bennett.

LEBANON, IND.—The Hoosier Machine Co. has been incorporated with a capital of $60,000 to manufacture machinery, by W. E. Callane, Martin Odekerk and M. E. Callane.

MUNCIE, IND.—Roy Vigus is in the market for a small list of machine tools with which to start a repair shop. His address is 1028 W. First street.

SOUTH BEND, IND. — The Studebaker Automobile Co. will erect a $30,000 service station, garage and repair shop at Lafayette and South streets.

SOUTH BEND, IND. — Auditor of St. Joseph county, A. F. Wolfe, will open bids Oct. 16 for the construction of a bridge in German township.

Tools Wanted

The Westinghouse Machine Co., East Pittsburgh, Pa., is in the market for the following equipment:

Two 6-foot planing machines, 6 feet between table and rail, 4 heads.

One 10-foot planing machine, 10 feet high, 26-foot table, 4 heads.

One 14-foot planing machine, 12 feet high, 26-foot table, 4 heads.

Two 4-foot planing machines, 4 feet between table and rail, 4 heads.

One 3-foot planing machine, 3 feet between table and rail, 3 heads.

One 10-foot vertical boring mill, 7 feet between table and rail.

One 8-foot vertical mill, 6 feet between table and rail.

One 6-foot vertical milling machine, 4 feet between table and rail.

Two 5-foot vertical milling machines, 3 feet 6 inches between table and rail.

Two 4-foot vertical milling machines, 3 feet between table and rail.

Three horizontal milling machines, 6 or 7-inch spindle, 42 inches from table to center of bar.

One post boring milling machine, 7-inch spindle.

Two horizontal boring mills, 3 or 4-inch spindle.

The above machines to be motor-driven on a 220-volt, direct current.

Six 42-inch geared head lathes.

One 48-inch geared head lathe.

One 84-inch geared head lathe.

Five 4-foot plain radial drills.

Two 6-foot plain radial drills.

One 1,000-ton forging press, sufficient to handle 40-inch ingot.

CHICAGO.—The Orbon Stove & Range Co. will build an addition.

CHICAGO.—The Stromberg Motor Service Co. will build a 6-story plant. C. W. Rapp, 59 West Washington street, is architect.

CHICAGO.—The Chicago & Alton Railroad, W. G. Bierd, 608 South Dearborn street, president, is taking bids on a freight terminal, three to five stories, to cost about $1,000,000.

CHICAGO.—Sherwin T. Cooper, 111 West Washington street, is planning to build an 11-story hotel 75 x 125 feet at Fifty-third street and Hyde Park avenue, of steel and brick.

QUINCY, ILL.—The Sheridan Stove Co. has been incorporated with $25,000 capital stock by E. H. Huenefeld, Laurence D. Smith and W. H. Govert.

ROCKFORD, ILL.—The Rockford Automatic Machine Co. has been incorporated to build machinery with $25,000 capital stock by Lee N. Daniels, L. N. Daniels and Oscar T. Wilson.

BATTLE CREEK, MICH. — The Flint Spring-Water Ice Co. will erect a distributing station of 1,000 tons capacity.

BAY CITY, MICH.—The Roeller Foundry Co. will build a 1-story addition 50 x 150 feet. W. S. Cooley is manager.

DETROIT.—The Detroit Insulated Wire Co. 641 Wesson street, will build a 2-story factory costing $18,000.

DETROIT.—The F. L. Jacob Co. will build a 1-story factory for the manufacture of automobile parts at a cost of $30,000.

DETROIT.—The Wolverine Machinery & Supply Co. has been incorporated with $10,000 capital stock by George C. Whitney, William C. Ketterring and Oliver D. Henry.

DETROIT.—The Wise Electro Sherardizing Co. has been incorporated with $15,000 capital by Robert E. Bans, Maxwell M. Wise and Charles L. Backus.

DETROIT.—The J. E. Bowles Iron & Wire Works has recommended an increase in capital stock from $150,000 to $500,000 to provide for the erection of an ornamental iron works plant on property recently purchased by the company.

ESCANABA, MICH.—The Chatfield Machine & Foundry Co. has been incorporated with $25,000 capital.

JACKSON, MICH. — The Walcott Lathe Co. will build a steel shop 132 x 132 feet.

KALAMAZOO, MICH. — The Kalamazoo Malleable Iron Co. will build a 1-story foundry 250 x 300 feet to cost $125,000. D. J. Albertson is architect.

MARQUETTE, MICH.—The Lake Shore Engine Works will build an addition to its plate shop.

MUSKEGON, MICH. — The new $30,000 foundry building of the Lakeside Foundry Co. is practically completed. Equipment will soon be installed.

ST. JOSEPH, MICH.—The Fay Foundry Co. will erect an addition to its foundry which will double the present capacity.

KEWAUNEE, WIS. — Frank Hamacheck, manufacturer of canning equipment and agricultural implements, is building a factory and machine shop 71 x 121 feet.

LA CROSSE, WIS.—The city of La Crosse is planning to build a bridge over Black river to cost $50,000.

MILWAUKEE.—The Industrial Controller Co. will build a 2-story plant for the manufacture of electrical devices. H. C. Hengels, First National Bank building, is architect.

WEST ALLIS, WIS.—The Steam Appliance Co., Burnham and Sixty-third streets, will build an addition to its foundry.

WEST ALLIS, WIS.—The Northern Pacific railroad will build a plant at West Allis for building and repairing steel cars.

KANSAS CITY, MO.—Plans are being made by the Bankers Realty Investment Co. for a 12-story hotel 142 x 240 feet to cost $1,000,000, which will be erected next spring.

KANSAS CITY, MO.—The National Machine Co., L. Alverson, manager, 914 Main street will equip a plant to manufacture fence guys.

KANSAS CITY MO.—The Wall Frogless Switch & Mfg. Co. will build a machine shop 75 x 116 feet costing $100,000. J. P. McHabe is manager.

ST. LOUIS.—The board of public service will ask bids shortly for about $200,000

worth of handling apparatus for the municipal docks.

ST. LOUIS.—The Sunkel Engineering Co. has been incorporated to manufacture heating, ventilating and lighting apparatus with $13,000 capital stock by Emil C. Sunkel and others.

CEDAR RAPIDS, IA.—The Pressed Steel Mfg. Co., E. C. Hampton, president, has been incorporated with $50,000 capital to manufacture machinery and heating systems.

CHARITON, IA.—The city of Chariton is planning to install a 500-gallon per minute pump.

CORNING, IA.—Bonds for $30,000 have been voted for a waterworks system, including pumping and ventilating machinery.

DES MOINES.—Plans are being prepared for a reinforced concrete bridge 500 feet long to cost $150,000. H. Susong is city clerk.

INDEPENDENCE, IA.—Bids will be received until Nov. 10 by R. W. Gearhart, city engineer, for a 3-span reinforced concrete bridge over the Wapsinicon river, costing $42,000.

ST. PAUL.—The Twin City Four Wheel Motor Drive Co. is building an addition to cost $30,000.

ST. PAUL.—The Megow Traction Co. is planning to build a tractor plant costing $100,000. The Foltz Engineering Co. is architect.

Business Changes, Consolidations and Expansions

The Youngstown & Southern Railway Co. operating between Youngstown and Leetonia, has been sold to W. J. Blackburn, representing Boston stockholders, for $650,000.

The name of the firm of G. L. Simonds & Co., Chicago, has been changed to the Vulcan Fuel Economy Co. There will be no change in the personnel or policies, but the capital of the company will be increased.

Property of the M. Heminway & Sons Silk Co., Waterbury, Conn., has been purchased by the R. N. Bassett Co., which will use the plant for manufacturing steel frames, locks, hinges, etc.

O. P. Chatfield has disposed of his entire interest in the Chatfield Brass & Iron Works, Escanaba, Mich., to H. H. and Frank Schepeck and C. H. Van Donk, who will change the name to the Chatfield Machine & Foundry Co.

G. F. Jones, Jacob Hilson and S. J. Sullivan, Little Rock, Ark., have formed a partnership to continue the business of the Argenta Foundry, which was suspended several months ago.

Harry Reid, president of the Kentucky Utilities Co., Lexington, Ky., announces that the lighting plants at Morganfield and Uniontown were purchased by his company, which is soon to take over other small Kentucky lighting plants.

Chicago interests are bidding for the J. F. Dornfeld machine shop, foundry and structural iron works at Watertown, Wis. Mr. Dornfeld is in Chicago conferring with the probable purchasers who hold an option of the plant.

The Poole Machine & Engineering Co., Baltimore, has bought the controling interest in the Motsinger Device & Mfg. Co., Lafayette, Ind. T. E. Laky, secretary-treasurer of the Baltimore company, has taken charge of the plant. The Poole company last April awarded a contract to the Motsinger company for the manufacture of 1,000,000 1-pound shells.

Kugel-Miner-Morse, Inc., has opened an office at Erie, Pa., to handle all kinds of merchant iron and steel as successor to the Miner-Morse Co.

The Tiger Drill Co., Beaver Dam, Wis., which succeeded the J. S. Rowell Co., maker of farm implements, has disposed of its plant and business to the Harris Bros. Co., Chicago, which intends to resume operations at an early date.

Grainger & Co., Louisville, Ky., structural iron, foundry and machine work, have extended the life of the corporation for 50 years. The company was incorporated 25 years ago and the business was established in 1883.

The Pennsylvania Seaboard Co., Pittsburgh, has purchased the plant of the National Steel Foundry Co., New Haven, Conn., and will use it at once for manufacturing ingots for munition plants.

In the South and Around the Gulf

PULASKI, VA.—The Pulaski Foundry & Mfg. Co. has been incorporated with $25,000 capital. Robert Bunts of Pulaski is president of the company.

BIRMINGHAM, ALA. — The Vaughan Boiler & Locomotive Works has been incorporated with $30,000 capital by J. B. Crawford, Edward B. Vaughan and others.

BIRMINGHAM, ALA.—The city commissioners are planning to build a 1,200-foot reinforced concrete viaduct at Twenty-first street, costing $150,000.

MOBILE, ALA.—H. C. Murname, Memphis, Tenn., has organized a company with $50,000 capital to erect a ship building plant on the Mobile river near here. A saw mill and iron works will be operated in connection with the plant.

TALLADEGA, ALA.—The Talladega Pipe & Foundry Co. has been incorporated to manufacture cast iron pipe. The company is capitalized at $20,000 by S. C. Oliver, R. T. Hicks and others.

BEARDEN, TENN.—Prices on a new or second hand engine lathe, and equipment for a lighting plant for a small community, and on a second-hand 6 or 7-foot band sawmill are asked for by the Colonial Lumber Co.

CHATTANOOGA, TENN.—The Price Mfg. Co., with $95,000 capital, has been incorporated by J. S. and S. S. Price, F. J. Miller and others and will manufacture foundry products.

ELIZABETHTON, TENN. — William S. Whiting will buy equipment for a machine shop and is in the market for the following second-hand machinery: 20-inch lathe, 12-inch lathe, 12-inch shaper, 30-inch radial drill and power hack saw.

KNOXVILLE, TENN.—The John G. Duncan Co. is in the market for a second-hand 500-horsepower Corliss engine, for quick delivery.

KNOXVILLE, TENN.—Design and specifications of a 15,000,000-gallon, triple expansion, centrifugal pump have been approved by the water commission, and the consulting engineer, H. C. Anderson, of Cincinnati, will shortly have the revised plans. He will also estimate cost of construction of filter and new pumping station, and estimate cost of addition to present station and power plant. The improvements to the Knoxville system are contingent on the $225,000 bond issue passing on Oct. 24.

FRANKFORT, KY.—The machine shop and engine room of the McDougall Kitchen Cabinet Co. was destroyed by fire.

LAWRENCEBURG, KY. — The Anderson County Construction Co. is in the market for a Leyner drill sharpener.

LOUISVILLE, KY.—Plans and specifications for the $300,000 improvements of the Louisville Water Co., including additional pump house, pump, etc., are completed and bids will be received until Oct. 15. W. O. Head, president, Board of Water Works, may be addressed.

PADACAH, KY.—The Golconda Portland Cement Co. has been organized to erect a $1,000,000 cement plant at Golconda, Ill. Maj. W. A. Calhoun of Padacah, is the consulting engineer.

PERRYVILLE, KY.—An electric light and power plant to cost $50,000 is projected here by Russell Bros. to take the place of the plant destroyed by fire.

CAVE SPRINGS, ARK.—The Snowden Engineering Co., a new corporation with $500,000 capital, G. H. Snowden, Kansas City, Mo., president, is planning to build a steam-driven electric plant.

BARTLESVILLE, OKLA. — The Osage Foundry & Machine Co. will rebuild its foundry at a cost of $10,000.

OKLAHOMA CITY, OKLA.—The Pippin Mfg. Co., R. C. Hawley, president, a new corporation with $300,000 capital will erect a fireproof factory for the manufacture of oil well supplies and will install equipment including millers, shapers, lathes, etc.

IRON AND STEEL PRICES

Corrected up to Tuesday noon

PIG IRON

(Lower price to Jan. 1, 1917; higher to July 1, 1917.)

Bessemer valley	$23.00
Bessemer, Pittsburgh	23.95
Basic, Pittsburgh	20.95
Basic, eastern Pa.	20.50 to 20.75
Basic, Buffalo	20.00
Malleable, Pittsburgh	20.95
Malleable foundry, Chicago	19.50
Malleable foundry, Philadelphia	21.25 to 21.75
Malleable foundry, Buffalo	20.00
No. 1X foundry, Philadelphia	20.75 to 21.00
No. 2 foundry, Pittsburgh	20.95
No. 2 foundry, Cleveland	20.00 to 20.30
No. 2 foundry, Ironton	19.00 to 20.00
No. 2 foundry, Chicago	19.00
No. 2X foundry, Philadelphia	20.25 to 20.75
No. 2X foundry, N. J. tidewater	20.50 to 20.75
No. 2X foundry, Buffalo	20.00
No. 2 plain, Philadelphia	20.00 to 20.25
No. 2 plain, N. J. tidewater	19.50 to 20.00
No. 2 plain, Buffalo	20.00
No. 2 southern, Birmingham	14.50 to 15.50
No. 2 southern, Cincinnati	17.40 to 18.40
No. 2 southern, Chicago	18.00 to 19.00
No. 2 southern, Phila. delivery	18.50 to 19.50
No. 2 southern, Cleveland	18.50 to 19.00
No. 2 southern, New York docks	18.50 to 19.00
No. 2 southern, Boston docks	18.75 to 19.25
No. 2 south. interior, New Eng.	19.50 to 20.50
No. 2 southern, St. Louis	18.40 to 18.90
Virginia No. 2X furnace	17.50
Virginia No. 2X, Philadelphia	19.75
Virginia, No. 2 X, Jersey City	20.50
Virginia 2X, Boston points	20.75
Gray forge, eastern Pa.	18.50 to 19.00
Gray forge, Pittsburgh	19.70 to 19.95
Gray forge, Birmingham	13.50
Silveries, 8 per cent, furnace	27.00 to 27.50
Silveries, 8 per cent, Chicago	29.50
Low phos. Standard, Phila.	37.00 to 40.00
Low phos. Lebanon, Pa., furnace	32.00 to 35.00
Low phos., Pittsburgh	30.00 to 31.00
Charcoal, Lake Superior, Chgo., Nos. 1 to 4	20.25 to 22.75
Charcoal, Buffalo	21.00 to 22.00
Charcoal, Birmingham	22.50 to 23.00

IRON ORE

Lake Superior Ores.
(Lower Lake Ports.)

Old range Bessemer, 55 per cent, ton	4.45
Mesabi Bessemer, 55 per cent, ton	4.20
Old range non-Bes., 51½ per cent, ton.	3.70
Mesabi non-Bess., 51½ per cent, ton	3.55

Eastern Ores.
(Per unit delivered eastern Pennsylvania.)

Pt. Henry fur., 60 per cent, unit	8.5c to 8.9c
Local N. Y. and N. J. ores, unit	9.0c to 9.50c
Port Henry lump, at mines, ton.	$4.00

Foreign Ores.
(Per unit Philadelphia.)

Foreign Bess., 50 to 65 per cent	nominal
For'n non-Bess., 50 to 65 per cent	nominal

COKE

(At the ovens.)

Connellsville furnace	$4.00 to 4.25
Connellsvil'e fur., contract	3.25
Connellsville foundry, contract	4.50
Connellsville foundry	4.50
Wise county furnace, contract	3.00 to 3.25
Wise county foundry, contract	3.50 to 3.75
Pocahontas foundry, contract	3.25 to 3.75
Pocahontas furnace, contract	3.00 to 3.25
New River foundry, contract	3.75 to 4.25
New River furnace, contract	3.25 to 3.50

FERRO ALLOYS AND STEEL MAKING METALS

Ferro manganese, 80 per cent, seaboard, as delivered prompt.	$164 to 166
Ferro manganese, 80 per cent, seaboard, as delivered, contract	164 to 166
Spiegel, 20 per cent, fur. early and last half	40.00 to 45.00
Ferro-silicon, 50 per cent, Pbg.	98.00 to 100.00

Bessemer ferro-silicon, 9 per cent to 10 per cent, $30.00; 10 to 11 per cent, $31.00; 11 to 12 per cent, $32.00; 12 to 13 per cent, $33.00 a ton at the furnace at Ashland, Jackson and New Straitsville, O.

Ferro-carbon titanium, 8 to 12½ cents per pound in carloads.

SEMI-FINISHED MATERIAL

Open hearth billets, Phila.	$48.00 to 50.00
Forging billets, Phila.	65.00
Forging billets, Pbgh., nominal.	65.00 to 70.00
Forging billets, Chicago	65.00
Wire rods, Pittsburgh (nom.)	55.00 to 60.00
Bessemer billets, Youngstown	45.00 to 50.00
Bessemer billets, Pittsburgh	45.00 to 50.00
Open hearth billets, Pittsburgh.	45.00 to 50.00
Open hearth billets, Youngstown	45.00 to 50.00
Bess. sheet bars, Youngstown	45.00 to 50.00
Op. h'th sheet bars, Youngstown	45.00 to 50.00
Bess. sheet bars, Pittsburgh	45.00 to 50.00
Open hearth sheet bars, Pbgh.	45.00 to 50.00
Muck bars, Pittsburgh (nominal)	45.00

SKELP

Grooved steel skelp	2.60c
Sheared steel skelp	3.00c

RAILS AND TRACK MATERIAL

(Gross tons.)

Stand. Bess. rails, Pbgh & Chgo.	$33.00
Stan. op-h'th rails, Pbg & Chgo.	35.00
Light rails, 8 to 10 lbs., Pbgh.	50.00
Light rails, 8 lb., Chicago	43.00
Light rails, 12 to 14 lbs., Pbgh.	49.00
Light rails, 12 lbs., Chicago	42.00
Light rails, 16 to 20 lbs., Pbgh.	48.00

Freight Rates, Pig Iron

Mahoning and Shenango valleys to:—

Cleveland	$0.95
Newark, N. J.	2.98
Boston	3.18
Philadelphia	2.78
Pittsburgh	.95
St. Louis	3.18

Buffalo to:—

Albany, N. Y.	$1.26
New England (all rail)	2.58
New York and Brooklyn (all rail)	2.58
New York and Brooklyn (by canal)	1.25 to 1.60

Virginia furnaces to:—

Boston docks (r. and w.)	$3.05
New England (all rail)	3.25
New York dock (r. and w.)	2.88

Birmingham, Ala., to:—

Cincinnati	$2.90
Chicago	4.00
Cleveland	4.00
Louisville, Ky.	2.65
New York (all rail)	6.15
New York, (r. and w.)	4.25
Philadelphia (all rail)	5.20
Philadelphia (r. and w.)	4.00
Pittsburgh	4.90
Savannah, Ga.	2.75

Chicago to:—

Des Moines	$2.80
Milwaukee	.50
Moline, Ill.	1.40
Omaha	3.58
St. Louis	1.58

Ironton and Jackson, O., to:—

Chicago	$2.54
Cincinnati	1.26
Cleveland	1.62
Detroit	1.81
Indianapolis	1.58

Light rails, 16 to 20 lbs., Chgo.	$41.00
Light rails, 25 to 45 lbs., Pbgh.	47.00
Light rails, 25 to 45 lbs., Chgo.	40.00
Relaying rails, standard, Pbgh. and Chicago	$23.00 to 24.00
Relaying rails light, Chicago	24.00 to 25.00
Angle bars, st. sect., Pbgh. base	2.00c
Angle bars, st. sections, Chgo.	2.00c to 2.50c
Spikes, railroad, Pittsburgh	2.65c to 2.75c
Spikes, railroad, Chicago	2.75c to 2.90c
Track bolts, Pittsburgh	3.25c to 3.50c
Track bolts, Chicago	3.25c to 3.50c
Tie plates, Chicago	50.00 to 55.00

SHAPES, PLATES AND BARS

Structural shapes, Pbgh	2.70c
Structural shapes, Philadelphia	2.859c to 3.009c
Structural shapes, Chgo.	2.79c to 3.50c
Structural shapes, New York	2.869c to 3.019c
Tank plates, Chgo.	3.19c to 3.60c
Tank plates, Pittsburgh (con.)	3.00c
Tank Plates, Pittsburgh	3.25c to 4.00c
Tank plates, Philadelphia	3.159c to 4.159c
Tank plates, New York	3.169c to 4.169c
Bars, soft steel, Chicago	2.79c to 3.50c
Bars, soft steel, Pbgh.	2.60c to 2.70c
Bars, soft steel, New York	2.769c
Bars, soft steel, Philadelphia	2.759c
Hoops, carloads, Pittsburgh	3.00c
Bands, Pittsburgh	2.60c
Shafting, Pbgh., contr. carloads	10 to 20 off
Bar iron, Chgo.	2.35c
Bar iron, Philadelphia	2.559c to 2.659c
Bar iron, Cleveland	2.55c
Bar iron, New York	2.569c to 2.669c
Bar iron, Pittsburgh	2.65c to 2.75c
Hard steel bars, Chgo.	2.50c

SHEETS AND TIN PLATE

(Differentials indicated below are not now being closely followed.)

Bessemer
BLUE ANNEALED SHEETS PITTSBURGH

	Per lb.
Nos. 3 to 8	2.95c to 3.05c
Nos. 9 to 10 (base)	3.00c to 3.10c
Nos. 11 and 12	3.05c to 3.15c
Nos. 13 and 14	3.10c to 3.20c
Nos. 15 and 16	3.20c to 3.30c

Bessemer
BOX ANNEALED SHEETS, COLD ROLLED PITTSBURGH

Nos. 17 to 21	2.95c to 3.05c
Nos. 22 and 24	3.00c to 3.10c
Nos. 25 and 26	3.05c to 3.15c
No. 27	3.10c to 3.20c
No. 28 (base)	3.15c to 3.25c
No. 29	3.20c to 3.30c
No. 30	3.30c to 3.40c

Bessemer
GALVANIZED SHEETS OF BLACK SHEET GAGE, PITTSBURGH

Nos. 10 and 11	3.40c
No. 12	3.50c
Nos. 13 and 14	3.50c
Nos. 15 and 16	3.65c
Nos. 17 to 21	3.80c
Nos. 22 and 24	3.95c
Nos. 25 and 26	4.10c
No. 27	4.25c
No. 28 (base)	4.40c
No. 29	4.50c

No. 28, black, Chicago	3.29c to 3.39c
No. 28 galvanized, Chicago	4.59c
No. 10, blue annealed, Phila.	3.159c to 3.419c
No. 10, blue annealed, Chgo.	3.19c to 3.29c
Tin plate, 100 lb., coke base	6.00

IRON AND STEEL PIPE

(Prices Adopted July 24, 1916.)

Steel.

Butt weld:—	Black.	Galv.
⅛, ¼ and ⅜ in.	62	35½
½ in.	66	51½
¾ to 3 in.	69	55½
Lap weld:—		
2 in.	63	50½
2½ to 6 in.	66	53½
7 to 12 in.	63	49½
13 and 14 in.	53½	..
15 in.	51	..

Iron.

Butt weld:—	Black.	Galv.
⅛ and ¼ in.	51	24
⅜ in.	52	25
½ in.	56	38
¾ to 1¼ in.	59	43
Lap weld:—		
1¼ in.	46	31
1½ in.	52	38
2 in.	53	39
2½ to 4 in.	55	42
4½ to 6 in.	55	42
7 to 12 in.	54	41

BOILER TUBES

Steel, 3½ to 4½ inches, l. c. l.	54
Iron, 3½ to 4½ inches, l. c. l.	44

WIRE PRODUCTS

(Retailers' price 5 cents above jobbers' quotations.)

Wire nails, jobbers', Pittsburgh	$2.60
Plain wire, jobbers', Pittsburgh	2.55
Galvanized wire, jobbers', Pbgh.	3.25
Polished staples, Pbgh.	2.75
Galvanized staples, Pbgh.	3.45
Barb wire, painted, jobbers' Pbgh.	2.75
Barb wire, galv., jobbers', Pbgh.	3.45

IRON AND STEEL PRICES

Corrected up to Tuesday noon

BOLTS AND NUTS

(Delivered within 20-cent freight radius.)

Carriage bolts, ⅜ x 6 inches, smaller or shorter, rolled thread, 50 and 5, cut threads, 40, 10 and 2½, larger or longer, 35 and 2½.

Machine bolts with hot pressed nuts ⅜ x 4 inches, smaller or shorter rolled 50, and 10; cut, 50; larger or longer, 40 and 5.

Cold pressed, semi-finished hexagon nuts, 60 and 5.

Gimlet and cone point lag bolts, 50 and 10. Hot pressed square, blank or tapped nuts, $2.70 off list; hot pressed hexagon blank or tapped, $2.70.

Cold pressed square, blank or tapped, $2.40 off; hexagon, blank or tapped, all sizes, $2.80.

RIVETS

Structural rivets, Pbgh	4.00c
Structural rivets, Chgo. delivery	4.00c
Boiler rivets, Pbgh	4.10c
Boiler rivets, Chgo. delivery	4.10c

Tinner's rivets, 45, 10 and 5 off, Pittsburgh.

STEEL SHEET PILING

(Pittsburgh.)

Base sizes	2.60c to 2.70c

STANDARD STEEL CHAIN

Chain, ⅜ inch proof coil	5.00c to 5.50c

COLD ROLLED STRIP STEEL

Base price 6.00c to 6.50c per 100 pounds, hard, coils 1½ inches and wider and by .100 inch and heavier.

Extra for Thickness.

0.100-inch and thicker	Base
0.050 to 0.099	$0.05
0.036 to 0.049	0.20
0.035	0.20
0.031 to 0.034	0.35
0.026 to 0.030	0.45
0.020 to 0.024	0.55
0.025	0.45
0.017 to 0.019	1.35
0.015 to 0.016	1.75
0.013 to 0.014	2.45
0.012	2.80
0.011	3.15
0.010	3.50

Other extras as per card of March 15, 1916.

CAST IRON WATER PIPE

Four-inch, Chicago	$34.50 to 35.00
Six-inch and larger, Chicago	31.50 to 32.00
Six-inch Class B, New York	31.50
Four-inch Class B, New York	34.50
Four and six-inch Birmingham	28.00
Six-inch and larger, Birmingham	25.00

Leight weight water and gas pipe $1 per ton higher than standard water.

WAREHOUSE PRICES

Steel bars, Chicago	3.25c
Steel squares, 2-in. & ov., Cleve.	3.90c
Steel rounds, 2-in. & ov., Cleve.	3.90c
Steel bars, under 2 in., Cleveland	3.40c
Steel bars, Detroit	3.25c
Steel bars, Philadelphia	3.25c
Steel bars, New York	3.35c
Steel bars, St. Louis	3.30c
Steel bars, Cincinnati	3.35c to 3.90c
Steel bars, St. Paul	3.38c
Steel bars, over 2-in., Buffalo	4.20c
Steel bars, Buffalo	3.35c
Iron bars, Chicago	3.10c
Iron bars, Cleveland	3.35c
Iron bars, Detroit	3.20c to 3.25c
Iron bars, St. Louis	3.20c to 3.25c
Iron bars, Cincinnati	3.35c to 3.90c
Iron bars, Philadelphia	3.25c
Iron bars, New York	3.35c
Shapes, Chicago	3.25c
Shapes, Detroit	3.25c
Shapes, St. Louis	3.30c
Shapes, St. Paul	3.35c
Shapes, New York	3.35c
Shapes, Cleveland	3.40c
Shapes, Philadelphia	3.25c
Shapes, Buffalo	3.35c
Shapes and plates, Cincinnati	3.35c to 3.50c
Plates, Chicago	3.75c
Plates, Detroit	3.75c to 4.00c
Plates, St. Louis	3.80c
Plates, St. Paul	3.85c
Plates, New York	4.00c to 4.50c
Plates, Cleveland	3.80c
Plates, Philadelphia	4.00c to 4.50c
No. 10 blue anl. sheets, Chicago	3.40c
No. 10 blue anl. sheets, Cleve.	3.50c
No. 10 blue anl. sheets, Buffalo	3.25c
No. 10 blue anl. sheets, St. L.	3.45c
No. 10 blue anl. sheets, Cinci.	3.50c
No. 10 blue anl. sheets, St. Paul	3.50c
No. 10 blue anl. sheets, Detroit	3.55c
No. 28 black sheets, Chicago	3.35c
No. 28 black sheets, Cleveland	3.40c
No. 28 black sheets, Cincinnati	3.40c
No. 28 black sheets, Detroit	3.40c to 3.50c
No. 28 black sheets, St. Louis	3.40c to 3.50c
No. 28 black sheets, St. Paul	3.50c
No. 28 galv. sheets, Chicago	4.65c to 4.75c
No. 28 galv. sheets, Cleveland	4.40c to 4.75c
No. 28 galv. sheets, Cincinnati	4.50c to 5.00c
No. 28 galv. sheets, Detroit	5.00c
No. 28 galv. sheets, St. Louis	4.80c to 5.00c
Hoops, Cleveland	4.00c

Freight Rates, Coke

Connellsville district, per 2,000 lbs., to:—	
Baltimore	$1.80
Buffalo	1.85
Chicago	2.50
Cleveland	1.60
Detroit	2.10
East St. Louis	2.80
Joliet	2.50
Louisville	2.50
Milwaukee	2.85
New York	2.85
Philadelphia	2.05
Pittsburgh	.75
Richmond, Va.	2.94
Toledo	1.85
Valley Furnaces	1.20
Cincinnati	2.00

IRON AND STEEL SCRAP

(Net Tons.)

Angle bars, iron, Chicago	$21.25 to 21.75
Angle bars, steel, St. Louis	15.75 to 16.00
Arch bars and transoms, Chgo.	22.25 to 22.75
Arch bars and transoms, St. L.	22.50 to 23.00
Boiler plate, cut, No. 1, Chgo.	10.50 to 11.00
Boiler plate, cut, No. 1, St. L.	11.50 to 12.00
Boiler punchings, Chicago	13.50 to 14.00
Bundled sheet, Cincinnati	8.00 to 8.50
Busheling, No. 1, Chicago	14.25 to 14.75
Busheling No. 1, Cincinnati	11.50 to 12.00
Busheling, No. 1, Cleveland	13.50 to 14.00
Busheling, No. 1, St. Louis	14.25 to 14.75
Busheling, No. 2, Chicago	9.50 to 10.00
Cast borings, Chicago	7.25 to 7.75
Cast borings, Cincinnati	4.50 to 5.00
Cast borings, Cleveland	6.50 to 6.75
Cast borings, St. Louis	8.25 to 8.50
Cast, No. 1, Chicago	13.00 to 13.50
Cast, No. 1, Cincinnati	12.00 to 12.50
Cast, No. 1, Cleveland	13.50 to 13.75
Cast, No. 1, St. Louis	13.00 to 13.50

Freight Rates, Finished Material

From Pittsburgh, carloads, per 100 lbs. to:—

New York	16.9 cents
Philadelphia	15.9 cents
Boston	18.9 cents
Buffalo	11.6 cents
Baltimore	15.4 cents
Cleveland	10.5 cents
Cincinnati	15.8 cents
Chicago	18.9 cents
Detroit	15.7 cents
Minneapolis and St. Paul	32.9 cents
Denver	83.6 cents
St. Louis	23.6 cents
New Orleans	30 cents
Birmingham	45 cents
Pacific coast (all rail)	73.9 cents
Pacific coast (tin plate)	70 cents
Pacific coast, via Panama canal	61.9 cents

Cut forge, Chicago	16.50 to 16.75
Iron axles, St. Louis	28.00 to 28.50
Iron axles, Cleve	28.00 to 29.00
Knuckles, coup., Chicago	16.50 to 17.00
Knuckles, coup., St. Louis	16.25 to 16.75
Locomotive tires, Chicago	23.50 to 24.00
Locomotive tires, St. Louis	23.50 to 24.00
Machine shop turnings, Chgo.	6.00 to 6.50
Machine shop turnings, Cleve.	5.25 to 5.75
Machine shop turn'gs, Cincinnati	5.25 to 5.75
Machine shop turnings, St. L.	7.25 to 7.50
Malleable agricultural, Chgo.	11.00 to 11.50
Malleable agricultural, St. Louis	11.75 to 12.00
Malleable, Cincinnati	8.75 to 9.25
Malleable railroad, Chicago	12.50 to 13.00
Malleable railroad, St. Louis	12.75 to 13.00
Pipes and flues, Cleveland	12.00 to 12.50
Pipes and flues, Chgo.	12.75 to 13.25
Pipes and flues, St. Louis	13.00 to 13.50
Railroad wrought, No. 1, Chgo.	17.50 to 18.00
Railroad wrought, No. 1, Cleve.	16.25 to 16.50
Railroad wrought, No. 1, St. L.	18.00 to 18.50
Railroad wrought, No. 1, Cinci.	13.50 to 14.00
Railroad wrought, No. 2, Chgo.	16.50 to 16.75
Railroad wrought, No. 2, St. L.	17.00 to 17.50
Shafting, St. Louis	21.50 to 22.00
Springs, Chicago	16.75 to 17.25
Steel car axles, St. Louis	33.50 to 34.00
Steel car axles, Chicago	34.00 to 35.00
Stove plate, Chicago	9.25 to 9.75
Stove plate, Cleveland	10.00
Stove plate, Buffalo	11.50 to 12.00
Stove plate, Cincinnati	8.00 to 8.50
Stove plates, St. Louis	10.75 to 11.00

(Gross tons.)

Axle turnings, Cleveland	$11.25 to 11.50
Busheling, No. 1, Buffalo	14.00 to 14.50
Busheling, No. 1, Pittsburgh	13.50 to 14.00
Busheling, No. 2, Buffalo	11.50 to 12.00
Bundled sheets, Pittsburgh	11.75 to 12.25
Bundled sheets, Cleveland	11.25 to 11.50
Bundled sheets, Buffalo	11.50 to 12.00
Car wheels, (iron), Pittsburgh	14.50 to 14.75
Car wheels (steel), Pittsburgh	18.50 to 19.00
Car wheels, Chicago	12.00 to 12.50
Car wheels, eastern Pa.	15.50 to 16.00
Car wheels, Buffalo	15.50 to 16.00
Car wheels, New York	13.50 to 13.75
Car wheels, St. Louis	13.00 to 13.25
Car wheels, Birmingham	10.50 to 11.00
Tram car wheels, B'ham	9.50 to 10.00
Cast borings, New York	7.00 to 7.50
Cast borings, eastern Pa.	10.00 to 10.50
Cast borings, Buffalo	7.50 to 7.75
Cast borings, Pittsburgh	8.50 to 9.00
Cast, No. 1, eastern Pa.	16.00 to 16.50
Cast, No. 1, Pittsburgh	15.25 to 15.50
Cast, No. 1, Birmingham	11.00 to 11.50
Cast, heavy No. 1, N. J. points	16.00 to 16.50
Forge, No. 1, eastern Pa.	12.00 to 12.50
Frogs, switches, guards, St. L.	17.25 to 17.75
Grate bars, Buffalo	11.50 to 12.00
Grate bars, N. J. points	12.00 to 12.25
Heavy axle turnings, Buffalo	12.00
Heavy melting steel, Pittsburgh	18.00 to 18.50
Heavy melting steel, Buffalo	17.00 to 17.50
Heavy melting steel, Chicago	16.50 to 17.00
Heavy melting steel, Cleveland	17.00 to 18.00
Heavy melting steel, Cincinnati	14.50 to 15.00
Heavy melting steel, eastern Pa.	15.00 to 16.00
Heavy melting steel, New York	14.00 to 14.50
Heavy melting steel, St. L.	17.50 to 18.00
Heavy melting steel, B'ham	11.00 to 11.50
Iron rails, Chicago	21.00 to 21.50
Iron rails, Buffalo	18.00 to 18.50
Iron rails, Cincinnati	16.00 to 16.50
Iron rails, St. Louis	19.25 to 19.75
Iron rails, Cleveland	20.00
Iron axles, Pittsburgh	32.00 to 35.00
Iron axles, Cincinnati	21.00 to 22.00
Iron axles, eastern Pa.	30.00 to 32.00
Iron axles, Chicago	35.00 to 36.00
Iron axles, Buffa'o	32.00 to 33.00
Low phos. steel, Buffalo	21.50 to 22.00
Low phos. steel, Pittsburgh	21.50 to 22.50
Low phos. steel, eastern Pa.	21.00 to 22.00
Machine shop turnings, Buffalo	6.00 to 6.50
Mch. shop turnings, New York	6.75 to 7.25
Mch. shop turnings, Pittsburgh	7.50 to 8.00
Mch. shop turnings, eastern Pa.	8.00 to 8.50
Mch. shop turnings, Birmingham	6.50 to 7.00
Malleable railroad, Cleveland	15.00 to 15.50
Malleable railroad, Buffalo	15.50 to 16.00
Malleable railroad, Pittsburgh	15.25 to 15.50
Malleable railroad, eastern Pa.	13.00 to 13.50
R. R. and mch. cast, No. 1 Bfl.	16.50 to 17.00
R. R. wrought, No. 1, Buffalo	18.00 to 19.50
R. R. wrgt., No. 1, eastern Pa.	22.00 to 22.50
City wrought, New York	16.00 to 16.50
R. R. wrought, No. 1, Pbgh.	19.00 to 19.50
R. R. wrought, No. 1, B'ham	12.00 to 12.50
Reroll. rails, 5 ft. & ov., Pbgh.	17.00 to 17.50
Reroll. rails, 5 ft. & ov., Chgo.	18.25 to 18.75
Reroll. rails, 5 ft. & ov., E. Pa.	18.50 to 19.00
Reroll. rails, 5 ft. & ov., St. L.	19.50 to 20.00
Shafting, New York	19.00 to 19.50
Shafting, eastern Pa.	21.00 to 22.00
Shoveling steel, Chicago	15.50 to 16.00
Shoveling steel, St. Louis	16.50 to 17.00
Steel rails, short, Chicago	17.75 to 18.25
Steel rails, short, Cleveland	19.00
Steel rails, over 6 ft. Cleveland	16.50
Steel rails, old, B'ham	12.00 to 12.50
Steel rails, short, St. Louis	17.50 to 18.00
Steel car axles, Birmingham	26.00 to 27.00
Steel car axles, New York	32.00 to 33.00
Steel car axles, Buffalo	32.00 to 33.00
Steel car axles, Cleveland	35.00 to 35.50
Steel car axles, Pittsburgh	32.00 to 35.00
Steel car axles, eastern Pa.	30.00 to 32.00
Stove plate, N. J. points	12.25 to 12.75
Stove plate, Birmingham	9.00 to 9.25
Stove plate, Pittsburgh	11.00 to 11.25
Stove plate, eastern Pa.	13.00 to 13.50
Wrought pipe, New York	13.75 to 14.00
Wrought pipe, eastern Pa.	16.00 to 16.50
Wrought pipe, Buffalo	13.00 to 13.50

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A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶ Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

ACCUMULATORS.
Birdsboro Steel Fdy. & Mch. Co., Birdsboro, Pa.
Chambersburg Engrg. Co., Chambersburg, Pa.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Mesta Machine Co., Pittsburgh, Pa.
Tod, Wm., Youngstown, O.
United Engrg. & Fdy. Co., Pittsburgh, Pa.
Wood, R. D., & Co., Philadelphia, Pa.

ACCUMULATORS.
(Hydraulic.)
Southwark Fdy. & Mch. Co., Philadelphia, Pa.

ACETYLENE IN CYLINDERS.
Linde Air Products Co., New York City.
Oxweld Acetylene Co., Newark, N. J.
Prest-O-Lite Co., The, Indianapolis, Ind.

AEROPLANE WIRE, STRAND AND CORD.
Roebling's, John A., Sons Co., Trenton, N. J.

AIR STORAGE TANKS.
Stewart-Warner Speedometer Corp., Chicago.

ALLOYS.
American Vanadium Co., Pittsburgh, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Blackwell, Geo. G., Sons & Co., Ltd., Liverpool, Eng.
Bourne-Fuller Co., The, Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Titanium Alloy Mfg. Co., Niagara Falls, N. Y.
United Steel Co., Canton, O.

ALUMINUM.
(Granulated.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Solder.)
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM.
(Vanadium.)
American Vanadium Co., Pittsburgh, Pa.

ALUMINUM ALLOYS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM INGOTS.
United Smelt'g & Alum. Co., New Haven, Ct.

ALUMINUM RODS.
(Sheet.)
United Smelt'g & Alum. Co., New Haven, Ct.

ANGLES, TEES, CHANNELS.
(See Steel, Structural.)

ANNEALING BOXES AND POTS.
Mesta Machine Co., Pittsburgh, Pa.
Pittsburgh Annealing Box Co., Pittsburgh, Pa.
Pittsburgh Malleable Iron Co., Pittsburgh, Pa.
Pittsburgh Valve Foundry & Const. Co., Pittsburgh, Pa.
Swedish Crucible Steel Co., Detroit, Mich.
United Engrg. & Foundry Co., Pittsburgh, Pa.
Zanesville Malleable Iron Co., Zanesville, O.

ANTIMONY.
Wah-Chang Mining & Smelting Co., New York City.

ANTIMONY OXIDES.
Wah-Chang Mining & Smelting Co., New York City.

ARMATURES.
Crocker-Wheeler Co., Ampere, N. J.
General Electric Co., Schenectady, N. Y.
Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

ASH BUCKETS.
Lakewood Engrg. Co., Cleveland, O.

AXLES.
American Bridge Co., New York City.
Bethlehem Steel Co., So. Bethlehem, Pa.
Cambria Steel Co., Philadelphia, Pa.
Camden Forge Co., Camden, N. J.
Carnegie Steel Co., Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
National Tube Co., Pittsburgh, Pa.
Otis Steel Co., Cleveland, O.

BABBITT METAL.
Keystone Bronze Co., Pittsburgh, Pa.
Lubricating Metal Co., The, New York City.
Ryerson, Jos. T., & Son, Chicago, Ill.

BAKERS, WIRE COATING.
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BALLS.
(Steel.)
Bethlehem Steel Co., The, So. Bethlehem, Pa.
New Departure Mfg. Co., Bristol, Conn.

BANDS.
(Steel.)
Carnegie Steel Co., Pittsburgh, Pa.

BARGES.
(Steel.)
American Bridge Co., New York City.

BARRELS, TUMBLING.
(Wire Nails.)
Turner, Vaughn & Taylor Co., Cuyahoga Falls, O.

BARS—ALLOY.
Central Steel Co., The, Massillon, O.

BARS.
(Concrete Reinforcing.)
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Inland Steel Co., Chicago, Ill.
Laclede Steel Co., St. Louis, Mo.
Ryerson, Jos. T., & Son, Chicago, Ill.
Trussed Concrete Steel Co., Detroit, Mich.
Upson Nut Co., Cleveland, O.

BARS.
(Iron and Steel.)
American Bridge Co., New York, N. Y.
American Iron & Steel Mfg. Co., Lebanon, Pa.
Belmont Iron Works, Philadelphia, Pa.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Brown-Wales Co., Boston, Mass.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Cincinnati Iron & Steel Co., Cincinnati, O.
Franklin Steel Works, Franklin, Pa.
Harvey, Arthur C., Co., Boston, Mass.
Illinois Steel Co., Chicago, Ill.
Illinois Steel Co., Warehouse Dept., Chicago.
Illinois Steel Warehouse Co., St. Louis, Mo.
Illinois Steel Warehouse Co., St. Paul, Minn.
Inland Steel Co., Chicago, Ill.
Jones & Laughlin Steel Co., Pittsburgh, Pa.
Lackawanna Steel Co., Buffalo, N. Y.
Lockhart Iron & Steel Co., Pittsburgh, Pa.
Milton Mfg. Co., Milton, Pa.
Republic Iron & Steel Co., Youngstown, O.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.
Standard Gauge Steel Co., Beaver Falls, Pa.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Trussed Concrete Steel Co., Detroit, Mich.
United Steel Co., Canton, O.
Upson Nut Co., Cleveland, O.
Westerman & Co., Lockport, N. Y.

BEAMS, CHANNELS AND ANGLES.
Belmont Iron Works, Philadelphia, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Franklin Steel Works, Franklin, Pa.
Illinois Steel Co., Chicago, Ill.
Ryerson, Joseph T., & Son, Chicago, Ill.
Scully Steel & Iron Co., Chicago, Ill.

BEARINGS.
(Ball.)
New Departure Mfg. Co., Bristol, Conn.

BEARINGS.
(Vanadium Steel.)
American Vanadium Co., The, Pittsburgh, Pa.

BELT CEMENT AND DRESSING.
Graton & Knight Mfg. Co., Worcester, Mass.
Texas Company, The, New York City.
Williams, I. B., & Sons, Dover, N. H.

BELT LACING.
(Leather.)
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BELTING.
(Chain.)
Link-Belt Company, Chicago, Ill.

BELTING—LEATHER.
Chicago Rawhide Mfg. Co., Chicago, Ill.
Graton & Knight Mfg. Co., Worcester, Mass.
Williams, I. B., & Sons, Dover, N. H.

BENCHES.
(Steel.)
New Britain Mach. Co., New Britain, Conn.

BENCHES AND FRAMES.
(Drawing.)
Morgan Construction Co., Worcester, Mass.
Turner, Vaughn & Taylor Co., The, Cuyahoga Falls, O.

BENDING AND STRAIGHTENING MACHINES.
Abramsen Engrg. Co., Pittsburgh, Pa.
Bertsch & Co., Cambridge City, Ind.
Birdsboro St'l Fdy. & Mch. Co., Birdsboro, Pa.
Cleveland Punch & Shear Works Co., Cleveland, O.
Espen-Lucas Machine Works, Philadelphia, Pa.
Hilman, D. A., & Co., Sandwich, Ill.
Hydraulic Press Mfg. Co., Mt. Gilead, O.
Mackintosh, Hemphill & Co., Pittsburgh, Pa.
Niles-Bement-Pond Co., New York, N. Y.
United Engrg. & Fdy. Co., Pittsburgh, Pa.

BENZOL, RECOVERY PLANTS.
Koppers, H., Co., Pittsburgh, Pa.

BILLETS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Cambria Steel Co., Philadelphia, Pa.
Carnegie Steel Co., Pittsburgh, Pa.
Central Steel Co., The, Massillon, O.
Illinois Steel Co., Chicago, Ill.
Inland Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Otis Steel Co., Cleveland, O.
Republic Iron & Steel Co., Youngstown, O.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Whitaker-Glessner Co., Portsmouth Works, Portsmouth, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sheet & Tube Co., Youngstown.

BLAST FURNACE SKIP CARS.
Lakewood Engrg. Co., Cleveland, O.

BLAST FURNACE TUYERES.
Keystone Bronze Co., Pittsburgh, Pa.

BLAST FURNACE VOLUME METERS.
Clark, Chas. J., Chicago, Ill.

BLOOMS.
Bethlehem Steel Co., The, So. Bethlehem, Pa.
Bourne-Fuller Co., Cleveland, O.
Carnegie Steel Co., Pittsburgh, Pa.
Hillman, J. H., & Sons, Pittsburgh, Pa.
Illinois Steel Co., Chicago, Ill.
La Belle Iron Works, Steubenville, O.
Lackawanna Steel Co., Buffalo, N. Y.
Tennessee Coal, Iron & R. R. Co., Birmingham, Ala.
Upson Nut Co., Cleveland, O.
Wood, Alan, Iron & Steel Co., Philadelphia.
Youngstown Sh't & Tube Co., Youngstown, O.

BLOWERS.
Connersville Blower Co., The, Connersville, Ind.
General Electric Co., Schenectady, N. Y.
Gilbert & Barker Mfg. Co., Springfield, Mass.
Roots, P. H. & F. M., Co., Connersville, Ind.
Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

BLUE PRINTING MACHINES.
(Electric.)
Wickes Brothers, Saginaw, Mich.

BOILER INSULATION.
Armstrong Cork & Insulation Co., Pittsburgh.

BOILER PLATES.
Cambria Steel Co., Philadelphia, Pa.
Worth Brothers Co., Philadelphia, Pa.

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